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SOUTH ATLANTIC

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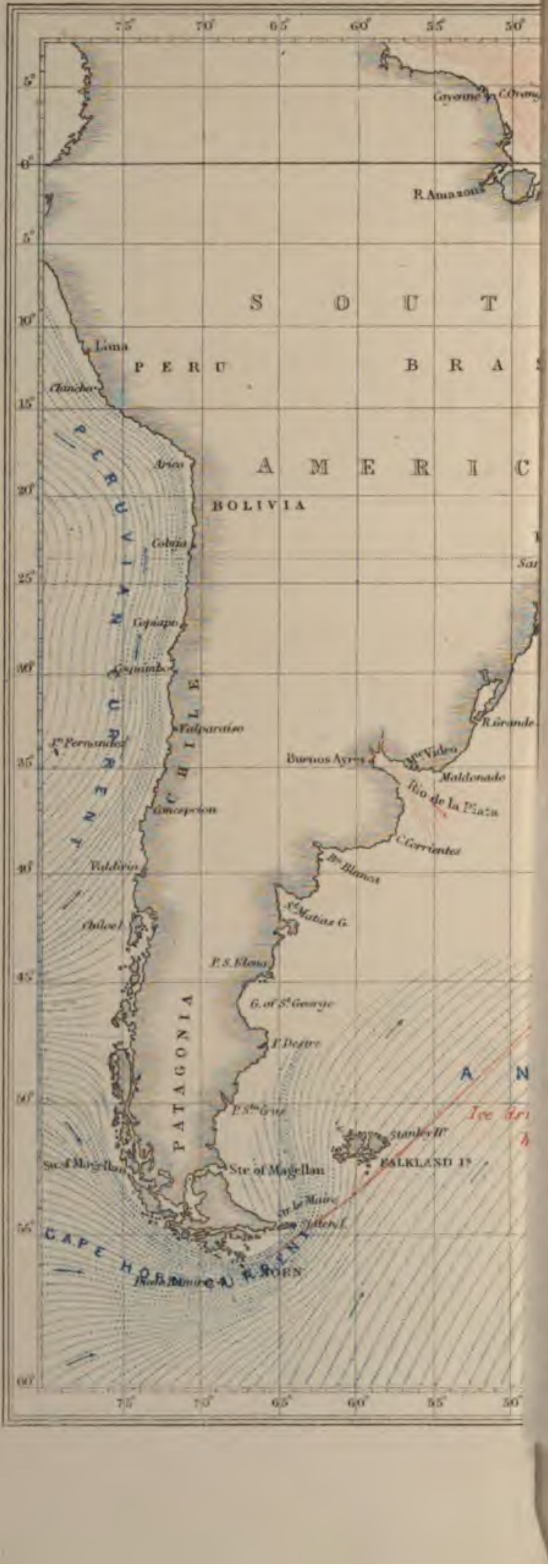

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A

SAILING DIRECTORY

FOR

THE ETHIOPIC

OR

SOUTH ATLANTIC OCEAN

INCLUDING A DESCRIPTION OF THE

COASTS OF SOUTH AMERICA

AND AFRICA.

NINTH EDITION.

BY ALEXANDER GEORGE FINDLAY, F.R.G.S.,

Honorary Member of the Società Geografica Italiana.

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PREFACE.

THIS Nautical Directory for the South Atlantic Ocean may be considered as a continuation or supplement to our volume on the North Atlantic. Arranged on the same plan, and embracing the same topics, much of the generalization on its meteorology and its application to the seaman's use, is common to both. But in the latter volume much has been dilated on which it has not been thought necessary to repeat here, further than was required to make this book complete in itself.

The early editions of this work bore the respected name of John Purdy as their author; but since his time, hydrography has so changed its requirements, that it has been necessary to remodel the whole, and rewrite almost every page. Thus the present edition bears but little resemblance to its earlier predecessors, and it may be considered therefore as a new work rather than an amplification of an old one.

With the exception of a portion of the Brasilian coast, recently surveyed by Captain Ernest Mouchez, of the Imperial Brasilian navy, it is true that there has been no systematic survey of the shores of South America or Africa within the period above named; but so numerous have been the additions to our knowledge, acquired from such a variety of sources, that it may be said that the descriptions which follow are a series of notes, added to the slight and imperfect, though so far exact, surveys of the French and English hydrographers of earlier times. It is trusted that no recent authentic source of information has been overlooked.

To enumerate here the authorities on which the work is based, would be to give a very long list of obligations, which, as they are quoted throughout its pages, would be needless. It is sufficient here to express that obligation.

In many points our nautical knowledge of the South Atlantic is very inferior to what we know of the Northern part of the great ocean. But then its meteorology is much more simple, and its commerce vastly inferior.

Some important enquiries have been made of late into some branches of its hydrography, its depth, the character and limits of its wind systems, and other topics, which are noticed in the work. One point of interest is the recent completion of the breakwater and docks at Cape Town, which will prove a great boon to those who have to double the Cape of Storms in the bad season. Another subject, which hitherto has not borne much fruit, but is destined hereafter to be of very great importance, is the opening of the great river Amazon and its tributaries, and San Francisco River, to the commerce of the world.

As above stated, there are many points which require further elucidation, or improved descriptions, but what is recorded here of most parts of the ocean is generally sufficient to ensure the best being made of their aid to navigation.

It is hoped that the varied information as to these subjects, and the descriptions of its coasts, ports, and islands, although they differ in value, will make this work an acceptable guide to the sailor.

A. G. FINDLAY.

London, December 31*st*, 1874.

Since the foregoing Preface was written, no new surveys of any great magnitude have been made on any of the coasts described in this Work, with the exception of the entrances of some of the West African rivers. Much additional information has been obtained from numerous sources, and no pains have been spared to make the *Ninth Edition* of this Work as complete as possible.

London, December 30*th*, 1882.

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THE

SOUTH ATLANTIC OCEAN.

⁂ THROUGHOUT THIS WORK THE GIVEN LONGITUDE IS THE LONGITUDE FROM GREENWICH, AND THE MILES GEOGRAPHIC OF 60 TO 1°. IN THE SAILING DIRECTIONS THE BEARINGS AND COURSES ARE THOSE BY COMPASS, UNLESS WHERE OTHERWISE EXPRESSED; BUT THOSE GIVEN THUS [*W.S.W.*] SIGNIFY THE TRUE; AND THE GIVEN DIRECTION OF WIND, TIDE, AND CURRENT, IS GENERALLY TO BE CONSIDERED AS THE TRUE.

SECTION I.

THE ETHIOPIC OF SOUTH ATLANTIC OCEAN is separated by the Equator from the North Atlantic. It presents a remarkable contrast to that sea in the absence of ports, caused by the straight and unbroken coasts which limit it, and also from not having any such archipelagoes as are met with North of the Equator. Besides this, a large portion of the coasts lying within the southern tropics, and the absolutely barren nature of its eastern side, render the commerce of this vast area of water of very small importance compared with other seas of equal magnitude. But it has few dangers in the great highways of shipping, and its navigation is simple and safe. As has been shown in our former volume on the North Atlantic, all the meteorological complications and difficulties are met with in North latitude, and therefore the Southern Ocean has a complete system of winds and currents of its own, readily understood and easily applied to navigation.

As an evidence of the different nature of the South to that of the North Atlantic, the length of their respective coast lines will conclusively indicate this wide distinction. The North Atlantic coast line (without the smaller islands) amounts to a total length, measured round its chief sinuosities, of 59,400 miles, while that of the South Atlantic does not exceed 9,320 miles—not a sixth part of the former. This length of coast is made up as follows:—

Brasil, North Coast	1400 miles.
Brasil, East Coast	2350 „
Uruguay	400 „
Buenos Ayres	750 „

Patagonia	1130 miles.
Tierra del Fuego	510
Total American coasts	6540
Total African coasts	2780
Or together	9320 miles.

It will not be necessary to state here upon what basis our exact kno
of this ocean and its phenomena rests; they will be recited in the co
the work. The book is arranged on the same plan as that of the accon
ing volume on the North Atlantic.

The name of the Ethiopic Ocean has been proposed for this portion
Atlantic, as it has in reality but few features in common with the Nor
lantic, though continuous with it; but this has never come into general

The limits of these oceans as defined by the Committee of the
Geographical Society in 1845, are as follows :—

"The limits of Arctic and Antarctic Oceans, respectively to be the
and Antarctic Circles; that the limits of the Atlantic on the North and
be the Arctic and Antarctic Circles; that its western limit be the c
America, as far South as Cape Horn, and thence prolonged on the meri
that cape, until it meets the Antarctic Circle; that its eastern limit
shores of Europe, and Africa as far South as the Cape of Good Ho
thence prolonged on the meridian of Cape Agulhas, till that meridian c
Antarctic Circle."

The assumed division between the two oceans being the mathe
Equator, has one inconvenience, inasmuch as the meteorological and
geographical divisions occur to the northward. The separation betw
wind and current systems of the two hemispheres may be taken as som
between 5° and 10° N. lat., while the African and American Contine
proaching each other nearest between Sierra Leone and the N.E.
Brasil about Cape San Roque, a distance of less than 1,600 miles, it follo
the Guinea coast is rather included in the southern portion than belon
the North Atlantic, and this is also found to hold good with regard
peculiar meteorology.

On this account the description of the African coast is included
volume, rather than in that devoted to the North Atlantic Ocean.

The first portion of this work embraces the geographical positions
various points accompanied by such notes as may be deemed necess
their elucidation. But this is the less necessary of late years, by reason
perfection of those official observations, which preclude the hope
private and isolated operations such as can only be carried on in an o
merchant ship, being made available for their improvement, or the de
of any discrepancies.

The second portion of the book deals with the winds, currents, tid
other influences on its navigation, which portion is followed by the ne
instructions for traversing it in various directions; and the final chapte
tain ample descriptions of its islands, coasts, and harbours.

POSITIONS OF PLACES, ETC.

I.—ISLANDS AND SHOALS.

⁂ The FIGURES *in Brackets refer to the* NOTES *subjoined to each Section.*

	Latitude.	Long. W.	Var. 1883.
VOLCANIC REGION ....[1]	° ′ ″	° ′ ″	
Crown Reef, 1835	0 57 0 S.	23 19 0	20° 5′ W.
La Pacifique Shoal (shock), 1771 ..	0 42 0	22 47 0	
Cæsar Breakers, 1730	2 0 0 N.	22 18 0	
Volcano (Lieutenant Evans), 1824..	7 0 0	21 50 0	
Warley Shoal, 1813	5 4 23	21 25 40	
Bell's Shoal (shocks), 1842	1 7 0 S.	21 21 0	
La Seine Bank, 1832	0 22 0	21 15 0	
Aquila Reef, 1831................	0 22 15	21 6 30	
La Silhouette Shoal (shock), 1754 ..	0 20 0	20 50 0	
Krusenstern's Volcano, 1806	2 43 0	20 35 0	
French Shoal, 1796 ?	4 5 0 N.	20 35 0	
Ferguson's Shoal (shock)..........	1 35 0 S.	20 27 0	
Philanthrope Shoal (shocks), 1836..	0 40 0	20 10 0	
Rackham's Shoal (shocks), 1842....	0 26 0	19 58 0	
French Shoal....................	4 15 0 N.	12 20 0	
Bouvet's Sandy Island, 1761	0 23 0 S.	19 10 0	
Circassian Bank, 1841	0 1 0	19 0 0	
Short's Volcano (shocks), 1852	3 30 0	24 30 0	
La Fidéle (shocks), 1758	0 20 0	18 0 0	
Triton Shoal, 1816	0 32 0	17 46 0	
Le Prince Shoal (shocks), 1747	1 35 0	17 15 0	
Henry Tanner Reef (vol. ashes), 1836	0 35 0	15 50 0	
Marie, 1853	0 12 0	19 0 0	
Prince (shock), 1853	0 54 0 N.	26 56 0	
Florence Nightingale (shock), 1859 .	0 44 0	29 20 0	
Passodnick (shock), 1859..........	0 29 0	28 30 0	
Sea Serpent (shock), 1859	0 29 0	28 30 0	
Dallas (shock), 1861..............	0 27 0	20 30 0	
Melbourne (shock), 1861	0 20 0	20 35 0	
Eleanor (shock), 1861	0 44 0	21 19 0	
Peñedo de San Pedro, or St. Paul's Islets summit	0 55 45 N.	29 22 45	16° 55′ W.
FERNANDO NORONHA ; the pyramid....	3 50 10 S.	32 25 30	15° 10′ W.
The ROCAS, centre ....[2]	3 51 27	33 48 57	14° 20′ W.
Shoal of Manoel Luis	0 52 10	44 16 56	
Isle of Trinidad ....[3]	20 31 0	29 18 58	15° 20′ W.
Martin Vas Rocks, the largest	20 27 40	28 52 45	
Hotspur Bank, the N.W. extreme......	17 51 30	36 5 9	11° 15′ W.
Victoria Bank	20 45 8	37 47 33	
Pilot Bank..........................	21 45 0	39 50 0	
Medeiros Rock	25 41 0	44 47 0	
Laurel Shoal, off the River Plate ..*about*	36 28 0	51 30 0	5° 15′ E.

ISLANDS AND SHOALS—CONTINUED.

	Lat. S.	Long. W.	Var. 1883.
ISLANDS, ETC.—continued.	° ′ ″	° ′ ″	
ASCENSION, the Barrack Square	7 55 48	14 25 18	23° 30′ W.
ST. HELENA, the Observatory [4]	15 55 26	5 42 30	26° 40′ W.
Grant Breakers? *about*	31 33 0	11 30 0	
Tristan da Cunha, N.W. point	37 2 48	12 18 39	22° 16′ W.
Inaccessible Island, centre	37 19 0	12 23 0	
Gough's Island (Diego Alvarez)	40 19 30	9 46 0	
Lennon's Reef *about*	37 31 0	4 42 0	
Robson Reef	37 35 0	7 31 0E.	
Bouvet, or Circumcision Island, the centre	54 16 0	6 14 0	
Montezuma Rock (1843)	29 32 0	39 30 0W	
Ariel Rocks?	40 0 0	57 37 0	
FALKLAND ISLANDS [5]			
PORT LOUIS, Govt. House at ANSON	51 32 0	58 7 30	13° 30′ E.
Berkeley Sound, entrance	51 35 0	57 50 15	
Cape Pembroke, Lighthouse	51 40 40	57 41 48	
Port Harriet, entrance	51 44 0	57 50 15	
Port FitzRoy, entrance	51 47 0	58 2 15	
Port Pleasant	51 48 55	58 11 41	
Choiseul Sound, Pyramid Point	52 1 20	58 36 15	
Lively Island, S.E. extreme	52 6 15	58 25 17	
Point Porpoise, Bay of Harbours	52 21 47	59 19 37	
Beauchene Island, South extreme [6]	52 54 45	59 12 15	
Mintey Rock *about*	52 54 0	59 17 15	
Sea Lion Isles, W. extreme	52 26 50	59 9 52	
George Island, S.W. Cliff	52 24 0	59 48 27	
Speedwell or Eagle Island, Jack's Harbour	52 13 0	59 41 31	
Elephant Cays	52 9 0	59 53 7	
Grantham Sound	51 35 30	59 13 15	
Sussex Harbour, entrance	51 39 0	59 3 15	
Port San Carlos, centre	51 30 0	59 5 15	
Fanning Head	51 28 6	59 8 50	
Cape Dolphin	51 14 35	58 58 45	
Eddystone Rock	51 11 30	59 3 30	
Port San Salvador	51 27 5	58 20 19	
Cape Carysfort	51 25 40	57 51 15	
Volunteer Point	51 31 15	57 43 55	
Uranie Rock	51 31 45	57 41 15	
Eagle Point	51 32 50	57 47 15	
PORT EGMONT, Ruins of Settlement	51 21 26	60 4 19	14° 42′ E.
Saunder's Island, N.W. summit	51 17 20	60 20 5	
Keppel Island, N.W. Cliff	51 18 45	60 3 15	
Cape Tamar, North Cliff summit	51 16 50	59 30 5	
Tamar Harbour, Eastern Head	51 20 32	59 25 57	
White Rock Point	51 24 23	59 12 37	
White Rock Harbour, South Head	51 26 25	59 13 15	
Many Branch Harbour, North point	51 31 5	59 20 45	
Port Howard, entrance	51 36 30	59 32 15	
Shag Harbour	51 43 30	59 38 15	
Fox Bay, East entrance	52 0 5	60 1 7	
Port Edgar, South Head	52 2 10	60 15 25	

ISLANDS AND SHOALS—*continued.*

	Lat. S.	Long. W.	Var. 1883.
FALKLAND ISLANDS—continued.	° ′ ″	° ′ ″	
Port Albemarle, North head	52 11 40	60 21 15	
Albemarle Rock	52 14 33	60 24 57	
Cape Meredith	52 16 15	60 39 22	
Port Stephens, East entrance point	52 11 50	60 42 42	
Bird Island	52 10 45	60 55 27	
Rodney Bluff........................	52 3 36	61 4 52	
Cape Orford	51 59 45	61 6 37	
Cape Split	51 49 20	61 20 52	
New Island, highest summit	51 42 7	61 18 7	
Coffin or Ship Harbour	51 43 10	61 17 22	
Passages Island, summit	51 34 55	60 47 3	
Split Island, West summit	51 28 5	60 42 25	
West Point Island, West bluff	51 23 0	60 43 27	
Jason Isles, West Kay................	51 0 8	61 27 17	
Steeple Jason, summit	51 4 0	61 9 52	
Hope Point, Hope Harbour	51 20 51	60 40 29	
Sedge Island, N.W. extreme	51 10 30	60 27 45	
Port Egmont Kay	51 13 5	63 9 25	
Pottinger's Bank	54 36 0	57 49 0	
Shag Rocks	53 48 0	43 25 0	5° 45′ E.
ISLE OF GEORGIA, OR SOUTH GEORGIA.			
Willis Island	54 0 0	38 23 0	2° 30′ E.
Adventure Bay, the head of	54 2 48	38 8 4	
Cape North ....[7]	54 4 45	38 15 0	
Cooper's Island	54 57 0	36 4 20	
Cape George	54 17 0	36 22 30	
Clerke's Rocks	55 5 30	34 42 0	
SANDWICH LANDS.			
Traverse Islands, Volcano	55 57 0	26 33 0	5° W.
Candlemas Isles ....[8]	57 10 0	27 13 0	
Cape Montague..................	58 33 0	26 46 0	
Southern Thulè	59 34 0	27 47 0	
Morrell's Western Point	59 35 10	27 42 30	
SOUTH SHETLANDS, &c. [9]			
Adelaide Island, West Point	67 14 0	68 26 0	26° E.
Mount William, Graham's Land	64 45 0	63 51 0	
Cape Possession......................	63 26 0	64 6 0	
Farewell Rocks......................	63 33 0	60 45 0	
Trinity Land, Tower Hill	63 29 0	60 26 0	
Hope Isle	63 5 0	57 4 0	
Astrolabe Island, East point	63 17 0	56 13 0	
Mount Jacqueminot, Louis Philippe Land	63 17 0	57 36 0	
Daussy Island	63 2 0	56 58 0	
Joinville Island, N.W. point	62 59 0	56 38 0	17° E.
Mount Percy	63 16 0	55 38 0	

ISLANDS AND SHOALS—CONTINUED.

	Lat. S.	Long. W.	Var. 1883.
SOUTH SHETLANDS, &c.—continued.			
	° ′ ″	° ′ ″	
Cape Purvis	63 37 0	55 46 0	
Cape Gordon	63 48 0	57 21 0	
Cockburn Island, 2,760 feet	64 12 0	56 50 0	
Cape Seymour, South point of Erebus and Terror Gulf, 1843	64 13 0	56 31 0	
Cape Lockyer	64 30 0	57 46 0	
Cape Foster	64 26 0	58 12 0	
Mount Haddington, 7,050 feet	64 14 0	58 3 0	
Deception Isle, Pendulum Cove	62 56 31	60 32 0	20° E.
Smith's Island, Mount Beaufort (6,600 ft. high)	62 52 0	63 13 0	
South Point	62 39 0	61 27 0	
Cape Shirreff	62 26 0	60 52 0	
Desolation Isle	62 25 0	60 30 0	
Table Island	62 20 0	59 40 0	
King George's Island, N.W. or Round Point	61 57 0	58 42 9	
Cape Melville	61 56 0	58 1 0	
Penguin Isle, East side of St. George's Bay	62 12 0	58 5 0	
Fildes' Strait, S.E. entrance	62 19 0	58 45 0	
Bridgeman's Isle, Volcano	62 4 0	57 0 0	
Aspland's Island, North point	61 27 0	56 20 0	
Cape Belsham, North point of Elephant Island	60 57 0	54 56 0	
Cornwallis Island, centre	61 0 0	54 23 0	
Lloyd's Promontory, N. end of Clarence Island	60 58 0	53 45 0	
Cape Bowles, South end of the same	58 18 0	53 32 0	
SOUTH ORKNEYS, or POWELL'S GROUP.			
Inaccessible Isles, centre	60 33 0	46 55 0	
Cape Faraday, the N E. point of Lewthwaite's Strait	60 39 0	45 1 0	
Cape Dundas, Laurie Island, East point	60 46 0	44 10 0	10° E.
Island of Alexander I.	68 57 0	73 0 0	
Island of Peter I.	68 0 0	91 0 0	

NOTES REFERRED TO IN THE PRECEDING TABLE.

1. VOLCANIC REGION.—In the following work are given the particulars of the *submarine* volcanoes and their effects, that have been met with in this part of the Atlantic Ocean, as far as we have been able to collect them. They are given there nearly in the order of their occurrence. They probably present no danger to the navigation; but similar phenomena may be met with in the neighbourhood. Some of them, it will be seen, lie beyond the limits of their frequent occurrence should the notices be correct, it will extend the space beyond the Equator and lat. 1° or 2° S.

between the eighteenth and twenty-second meridians, the limits we have assigned to it in the ensuing pages, within which the greatest portion of them have occurred. It may be that the shocks have been felt at considerable distances from their centres, and therefore the positions given in the Table cannot be said, in those cases, to give the situation of the volcano itself. In the Table their positions are given, commencing from the westward.

2. THE ROCAS.—These important and dangerous rocks were for many years placed in a very erroneous position, about 18 miles too far to the East. This was of serious consequence when the western route across the Equator was advocated by Captain Maury. It seems to have arisen from the assertions in the first edition of Horsburgh's Directory in 1809, and repeated in all subsequent editions, in opposition to the *correct* determination by M. Lartigue, under the Baron Roussin in 1825. It was first pointed out by Lieut. Lee, U.S.N., when in the *Dolphin*, in April, 1852, he surveyed the group, and they were again partially surveyed by Lieut. J. E. Parish, in H.M.S. *Sharp-shooter*, in March, 1856, placing them about 2 miles East of Lieut. Lee's longitude; but as the latter agrees with M. Lartigue, it is given in the Table. They were also surveyed by Lieut. Vital de Oliveira, of the Brasilian navy, in 1858.

3. TRINIDAD AND MARTIN VAZ.—This isle and the islets of Martin Vaz were surveyed in October, 1822, by M. Bérard, an officer of *La Coquille*, commanded by Captain Duperrey, who gives the larger islet of Martin Vaz in lat. 20° 27′ 40″, long. 28° 52′ 38″; consequently a little to the North and East of the position given in the Table. M. Bérard places the S.E. point of Trinidad in lat. 20° 29′ 55″, long. 29° 20′. Hence the *true* bearing and distance between the two is W. 4° S. 26 miles. The variation of the compass was 15° 20′ W. in 1883, and the magnetic bearing is, therefore, W. by N.

4. ST. HELENA.—The position of St. Helena has been finally settled, by means of an Observatory, in long. 5° 42′ 30″ W., which was established by the East India Company, but is now disused.

5. FALKLAND ISLANDS.—The positions of these Islands are those given by the late Admiral FitzRoy, who spared neither pains nor expense in exploring them. Their longitudes depend upon that of the flagstaff at the Government House at Port Louis (Anson), which was found to be, by repeated chronometric measurements, 12° 50′ 30″ East of Port Famine (70° 58′ 0″), the fundamental point of Capt. King's operations, but which, from a different assumption of the longitude of Rio Janeiro, he places 3′ 52″ *eastward* of the position assigned to it in the Table.

6. BEAUCHENE ISLAND.—In Captain FitzRoy's Tables the position of this island appears to be given erroneously, it being there stated as in 52° 41′, and long. 59° 5′ (the South extreme), or 13′ 45″ N., and 7′ 15″ West of the place assigned to it on the Admiralty Chart, which is that given in the Table; and which, from the bearings given from fixed points in the Survey, we presume is correct.

7. SOUTH GEORGIA.—Adventure Bay, near the N.W. end of Georgia, and South of Cape North, is given as described by Captain Weddell. The other points are given from Captain Cook's Second Voyage, January, 1775.

8. SANDWICH LANDS.—The Candlemas Isles, Cape Montague, and Southern Thulé, are given in the Table from Captain Cook's Second Voyage, January and February, 1775; but Captain Biscoe states that the longitudes are about 50′ to the West, which we are apprehensive, requires confirmation.

9. SOUTH SHETLANDS.—The position of these islands are generally unsatisfactory, with the exception of Deception Island, the station of Captain Foster's pendulum experiments. A chart, published by the Hydrographic Office, exhibits them much to the *eastward*, in some cases nearly to the amount of 2°. In these high latitudes

it is, without doubt, a difficult task to fix meridional distances, or absolute positions, with that degree of accuracy that can be attained in lower latitudes and less rigorous climates. In the absence of more certain authorities, we have repeated the positions as given in the former edition.

II.—THE NORTHERN COAST OF BRASIL FROM CAPE SAN ROQUE, WESTWARD.

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
Cape San Roque, 183 feet high; extreme [1]	5 29 15	35 15 18	13° 10′ W.
Point Pititinga, remarkable tree, 150 ft.	5 23 30	35 19 0	
Point Gamelleira, extreme	5 12 40	35 27 0	
Point Calcanhar, low extreme	5 9 30	35 29 0	
Morro Branco, or Cajueiras, hill, 177 ft. high	5 8 28	35 31 55	
Caicara, village......................	5 3 15	36 2 45	
Mangue Secco Hill	5 8 50	36 25 45	
Urca Cotia Shoal, East end............	4 52 50	35 49 10	
Lavandeira Reef, N.E. extreme	4 51 0	35 54 20	
Urca Tubarao Shoal, centre	4 51 0	36 27 0	
Punta do Mel, 308 feet, extreme	4 56 10	36 53 10	
Joao da Cunha, or Angerstein Reef, North end	4 44 0	36 59 0	
Rio Mossoro, East point of entrance....	4 57 30	37 9 5	
Morro Tubao..........................	4 49 20	37 17 0	
Reteiro Grande, or Punta Grossa	4 35 25	37 28 10	
Aracati, or Jaguarybé River, bar	4 23 15	37 44 0	
Cape Iguape, 394 feet	3 56 45	38 16 23	
Pedro Caxoeira Reef, 7 feet	3 50 0	38 21 20	
Point Mocoripe, lighthouse............	3 42 5	38 27 30	
Ceara, or Villa da Fortaleza, the cathedral ....[2]	3 42 50	38 31 9	10° 42′ W.
Aratanha Peak, 2,559 feet	3 57 50	38 38 0	
Peak of Massaranguape, 3,018 feet	3 53 20	38 43 0	
Morro Jua, 2,100 feet	3 47 0	38 46 0	
Morro Cahuipe, 1,247 feet	3 41 0	38 45 0	
Point Curumicuara	3 23 5	38 58 40	
Morro Melancia	3 11 10	39 21 0	
Mundahu, entrance of river	3 10 30	39 22 30	9° 50′ W.
Pointe dos Patos	3 0 30	39 40 10	
Morro Sergento......................	2 56 15	39 51 10	
Morro Mocuripe, or Curral Grande, 2,700 feet	3 16 20	40 12 45	
Barra Acaracu, entrance of river	2 49 30	40 8 30	
Cape Jericoacoara, 360 feet, summit	2 47 10	40 29 30	8° 50′ W.
River Camoçim, East point of entrance..	2 53 24	40 51 15	
River d'Iguaraçu, or Amaraçao, Barra Velha	2 53 20	41 39 41	
Rio Paranahyba, Punta Pedra do Sal light	2 49 19	41 43 15	
————————, Barra Canavieiras ..	2 44 30	41 50 0	
————————, Barra do Meio......	2 44 10	41 55 33	

THE NORTHERN COAST OF BRASIL—CONTINUED.

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
RIO PARANAHYBA, Barra Caju	2 41 25	42 1 10	
——————, Barra Carapato	2 41 42	42 12 0	
——————, Barra Tutoia ....[3]	2 41 55	42 16 46	7° 37′ W.
Perguiças, or Emile Bank, 6 feet	2 30 0	42 45 20	
Barra Perguiças	2 34 30	42 44 10	7° 12′ W.
Morros Alegres	2 23 0	43 14 0	
Morro Viado	2 25 28	43 23 20	
Point Mangues Verdes................	2 20 28	43 18 15	
Da Cruz Bank	2 18 45	43 10 0	
Santa Anna Island, lighthouse	2 16 22	43 35 20	
Santa Anna Reefs, Cesar Bank	2 14 45	43 27 28	6° 40′ W.
Coroa Grande, N.E. point of bank......	2 11 30	43 51 38	
Bank Do Meio, North point	2 16 0	44 9 20	
MARANHAM ISLAND, Morro Aracaji, 220 feet	2 27 5	44 8 10	
——————, San Marcos Point, lighthouse	2 29 16	44 17 0	
——————, Point d'Areia, fort	2 30 20	44 18 0	
——————, **SAN LUIZ DE MARANHAM**, cathedral.............. [4]	2 31 42	44 18 21	6° 0′ W.
Alcantara, cathedral ....[5]	2 24 26	44 24 0	
Point Pirarema....................	2 20 25	44 20 20	
Morro Alegre, 190 feet	2 18 27	44 21 0	
Itacolomi, lighthouse	2 10 11	44 24 45	
Shoal of Manoel Luiz, Western Rock ..	0 51 25	44 16 56	
Anchorage of *La Bayadère*, before the same	0 52 3	44 17 9	
Vigia, seen by M. Sylva	0 32 0	44 17 14	
San Joao Island, N.E. extremity	1 14 30	44 53 57	5° 52′ W.
Cape Gurupi	0 54 5	46 13 45	4° 50′ W.
Point Atalaia, lighthouse	0 35 0	47 20 30	4° 10′ W.
Point Tijoca	0 34 0	47 54 25	
Gaivotas Islet, light..................	0 35 20	48 1 15	
PARA′, Custom-house portico (long. by Telegraph)......................	1 26 59	48 30 0	3° 20′ W.

NOTES.

1. The **NORTHERN COAST OF BRASIL** was first surveyed by the late Capt. Hewett, in 1814, and when a lieutenant in H.M.S. *Inconstant* in 1817, then on this station. This was done at the expense of the predecessors of the present publisher, and showed that many grave errors, even so far as placing Maranham 2° too far to the West, existed in previous charts.

It was very cursorily examined by the Baron Roussin, commander of the French Hydrographic Expedition, but the positions of the points then gained were accurate.

The coast was subsequently surveyed, by order of the Imperial Government of Brasil, in 1857-9, by Lieutenant A. Vital de Oliveira, whose work was limited on the West by the Rio Mossoro, but this was found in many parts to be very defective.

The present positions and delineations are chiefly due to the survey by Captain Ernest Mouchez, of the French Imperial Navy, published in 1869.

The space between Maranham and Para′ is from the survey by Captain M. L.

Tardy de Montravel. But it may be generally stated that the charts of the coast are not so complete as could be desired. This will be further alluded to in the subsequent pages.

2. CEARA.—Roussin places Ceara 3° 42′ 8″ East of Pernambuco; Lartigue makes the difference 3° 39′ 58″; mean of the two, 3° 41′ 3″; this makes the longitude of Ceara 38° 32′ 56″. M. Lartigue makes Ceara 5° 41′ 11″ East of Maranham, or 38° 31′ 9″. We have given the last result, which is confirmed exactly by Captain Mouchez.

3. TUTOIA, or TUTOYAH.—This place was almost unknown when Baron Roussin was here, and he misplaces it to a very considerable extent. Captain Mouchez says that it is a splendid harbour, at the mouth of a fine river, by which commerce could be easily carried on with the interior. Yet this harbour of refuge, available at all times of tide for any class of vessel, is unknown, and uninhabited, though the small and dangerous bar harbour of Amaraçao, 30 miles to the East, is much frequented.

4. MARANHAM.—Capt. Sabine's position of the Cathedral of Maranham, as quoted by Commodore Owen, is lat. 2° 31′ 42″, long. 44° 18′ 30″; but the longitude originally given, from Captain Sabine's observations in his own volume, is 44° 21′ 18″. With the reason of this difference we are not acquainted. The observations were made at the house of the British Consul, adjoining the cathedral; so that the longitude may be referred to that structure, without sensible error. The longitude was the result of 158 lunar distances (16 sets) taken in the months of August and September, 1822, in conjunction with several chronometric differences, &c. The Baron Roussin places it in 44° 16′ 2″, reckoning from Anhatomirim, upon which all his longitudes depend (*Pilote du Brésil*, page 13); but as we have placed Anhatomirim 6′ 54″ *eastward* ot his position, this will only give 44° 9′ 8″. Although this determination accords with the observations of Sir E. Home (44° 8′ 7″), still, in measuring westward, great discrepancies will be found, which may be obviated by referring to other observations.

Captain Hewett, as above, places St. Marcos Point (6′ East of the Cathedral) in 44° 15′; but as his longitude of Rat Island, Rio Janeiro, is 3′ 15″ East of our position, it will make it 44° 18′ 21″ (Cathedral 44° 18 21″), precisely the result obtained by Captain Forster by his run from Fernando Noronha, July, 1831; and as this will also nearly coincide with the measurement from Para′, we have given this longitude in the Table.

5. MARANHAM TO PARA′.—The late indefatigable Capt. C. Philippe de Kerhallet, of the Imperial French Navy, drew up some instructions for this portion of the coast in 1841, but the survey by Lieutenant (afterwards Captain) Hewett, R.N., was the chief basis of the chart. This survey was, in some degree, amended by that made by Capt. Tardy de Montravel, by order of the French Government, in 1840, the results of which are given hereafter.

III.—EASTERN COAST OF BRASIL.

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
CAPE SAN ROQUE ....[1]	5 29 15	35 15 18	13° 10′ W.
Rio Ceara-mirim, S. point of entrance ..	5 41 15	35 12 30	
Rio Grande, Fort dos Reis Magos, light	5 45 5	35 11 25	
————, Natal, town	5 46 35	35 12 15	13° 15′ W.
Ponta Negra, extremity	5 52 30	35 9 5	

EASTERN COAST OF BRASIL—CONTINUED.

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
Cotovello, point North of	5 58 40	35 7 27	
Rio Camaropim, mouth	6 6 38	35 5 50	
Point Pipa, North end	6 14 25	35 2 30	
Rio Cunhahu, South point of entrance	6 20 0	35 1 30	
Formosa, N.W. part	6 23 20	35 0 45	
Rio Guaju, entrance	6 29 15	34 58 5	
Bahia da Traiçao, S.E. point	6 41 45	34 55 35	
Rio Mamanguapé, S. point of entrance	6 46 10	34 51 5	
Point Lucena, extreme	6 54 5	34 50 55	
Rio de Parahiba, lighthouse on Pedra Secca Rocks	6 56 35	34 49 10	13° 24′ W.
Parahiba, church	7 7 0	34 53 0	
Cape Branco, cliff	7 8 15	34 47 0	
Nossa Senhora da Penha	7 9 10	34 47 20	
Jucuman, village	7 16 30	34 47 30	
Petimbu, church	7 25 20	34 47 35	
Rio de Goiana, Point Guagiru	7 32 18	34 49 20	
Point das Pedras, extreme	7 37 10	34 48 15	
Funil Point, hill	7 40 5	34 50 0	
Itamaraca Island, Fort on S.E. point	7 48 40	34 50 0	
Maria Farinha	7 50 45	34 50 15	
OLINDA, lighthouse on old fort	8 0 50	34 50 30	
PERNAMBUCO, lighthouse North of Fort Picao	8 3 30	34 51 56	13° 10′ W.
———, Recife, South part [2]	8 4 7	34 52 15	
———, Boa Vista, Bibaribe River entrance	8 2 30	34 52 5	
Santo Antonio, fort	8 4 25	34 52 35	
Candeia, church	8 13 0	34 56 0	
San Gonzalo, chapel on the Downs	8 17 20	34 58 0	
Cape San Agostinho, church on summit	8 20 25	34 57 10	
Cupé, extreme of point	8 26 20	34 58 55	
Monte Sellada, S. peak, 13½ miles inland	8 24 30	35 13 5	
Maracahype, village	8 32 0	35 0 35	
Santo Aleixo, South point of East islet	8 36 0	35 0 35	
Rio Formoso, chapel at entrance	8 39 0	35 4 35	
Tamandaré, fort to South	8 43 32	35 5 0	
Rio Una, mouth	8 50 0	35 8 5	
San Bento, church	9 5 0	35 17 25	
Port de Pedras, anchorage	9 10 0	35 19 0	
Rio Camaragibe, estancia	9 20 15	35 26 0	
Tabuba, anchorage off	9 27 40	35 30 15	
Point Verde, extreme	9 40 0	35 39 35	
Maceio, *lighthouse*	9 39 45	35 41 30	12° 34′ W.
Porto Francez, village	9 45 0	35 45 45	
Rio de San Miguel, village on S. point	9 50 40	35 49 40	
Jiquia, East end of village	10 2 30	35 59 0	
Coruripe, South extreme of point	10 10 0	36 6 15	
Japu, bank, 7 feet	10 18 0	36 9 30	
Péba, extreme of point	10 20 0	36 15 15	
Rio de San Francisco, N. point, lt.-house	10 28 50	36 20 15	10° 54′ W.
Mountains of Itabayanna, summit	10 47 10	37 23 0	
River Cotinguiba, watch-tower	11 1 0	36 59 30	
Rio Vasa Barris, the Bar	11 11 0	37 7 30	11° 5′ W.
Os Tres Irmaos, or the Three Brothers	11 15 37	37 18 9	

EASTERN COAST OF BRASIL—Continued.

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
Rio Real, North point	11 27 0	37 21 0	
Tower of Garcia da Vila	12 34 26	38 0 14	
Rio Jacuipe, entrance	12 42 32	38 7 0	
Itapuan, Piraboca Rock lighthouse	12 57 30	38 20 48	
Itapuazinho, the point	13 0 59	38 27 30	
——, the flagstaff	13 1 3	38 28 37	
BAHIA, the Lighthouse on Fort San Antonio [3]	13 0 45	38 32 6	9° 55′ W.
Nossa Senhora de Bom Fim, the steeple	12 55 40	38 30 30	
Nossa Senhora de Mont-Serate, the steeple	12 55 58	38 31 10	
Piton of the Isle dos Frades	12 49 28	38 38 5	
Point Jaburu, in Itaporica	12 57 36	38 36 0	
Nossa Senhora da Penha	12 59 16	38 36 45	
Morro of St. Amaro, in Itaporica	13 1 8	38 45 40	
Knoll of Conceiçao	13 2 33	38 41 30	
Point Aratuba	13 5 7	38 44 33	
Point Caixo-Pregos	13 7 33	38 46 42	
Morro of San Paulo, *lighthouse*	13 22 35	38 54 30	
Hill W.N.W. from the same	13 19 27	39 0 26	
Isle Boypeda, one of the summits	13 37 43	38 57 0	
Isle Quiepé, Port Camamu	13 50 58	38 57 0	
Villa de Contas, church	14 17 40	38 59 0	9° 15′ W.
Os Ilheos, the largest rock	14 46 0	39 1 30	
Town of San Jorge dos Ilheos	14 48 0	39 2 15	
Village of Una	14 59 7	39 0 43	
Morro of Commandatuba, the S.E. summit	15 21 40	39 16 30	
Village of Commandatuba	15 27 0	39 0 20	9° 10′ W.
Town of Belmonte	15 51 4	38 52 30	
Santa Cruz, the steeple	16 17 20	39 1 41	
Porto Seguro, steeple of the cathedral	16 26 50	39 3 4	
Nossa Senhora da Judea, chapel	16 28 25	39 3 20	8° 55′ W.
Monte Pascoal or Pascal, summit 1,758 ft.	16 53 20	39 24 0	
Mount Joao de Liam, the summit	17 0 26	39 36 28	
Mouth of the Rio Cramimuan	16 47 12	39 8 15	
Comoxatiba Point	17 6 15	39 11 14	
Villa Prado, flagstaff on the fort	17 19 28	39 14 5	
Caravelhas, Punta Balea	17 41 34	39 6 8	
Port Alegre, entrance of the Riv. Mucury	18 7 0	39 31 45	
Paracel dos Paredes, N.E. point	17 40 15	38 56 54	
ABROLHOS ISLES, N.E. Rock... [4]	17 57 15	38 41 20	8° 30′ W.
——, Sta. Barbara, *lt.-house*	17 57 31	38 41 22	
Rio de San Matheo, North point	18 37 40	39 39 31	8° 0′ W.
Rio Doce, West point of the entrance	19 36 57	39 47 57	7° 35 W.
Serra dos Reis Magos, Southern summit.	19 50 27	40 19 54	
Morro Almeyda	19 57 20	40 17 25	
Mestre Alvaro, the summit	20 8 54	40 19 57	
O Tubarao, rock near the Cape	20 16 23	40 14 1	
Cape Tubarao, S.W. point	20 16 22	40 15 15	
Espirito Santo, Conv. of N.S. da Penha.	20 19 23	40 16 12	7° 0′ W.
VICTORIA, Needle Rock to N. of the town	20 17 49	40 20 32	
——, Balea Reef	20 19 0	40 15 32	
Mount Moreno, the summit	20 19 23	40 15 47	
Pacotes Rocks, the largest	20 21 2	40 14 15	
Isle Jicu, the summit	20 23 9	40 18 16	
Point Jicu, the summit	20 27 1	40 19 47	

EASTERN COAST OF BRASIL—Continued.

	Lat. S.			Long. W.			Var. 1883.
	°	′	″	°	′	″	
Ilhas Razas (Low Islet), the middle.. ...	20	42	42	40	22	17	
Isle Escalvada, the middle	20	44	8	40	24	54	
Guarapari, steeple on S. point of the Bay	20	42	0	40	32	28	
Morro Orobo (1,082 ft.)	20	45	30	40	39	2	
Benevente, Church	20	48	45	40	40	50	
Serro do Pico, highest part....	20	50	0	41	1	30	
Mount Campos (4,592 ft.)	21	34	10	41	32	22	
St. Joao da Barra, Barra Parahiba	21	37	50	41	1	30	
Cape San Thomé, East extreme	21	59	0	40	58	20	6° 24′ W.
————, *lighthouse*............	22	2	0	41	0	0	
Sta. Anna Islets, the largest	22	26	0	41	43	0	
Peak of Frade de Macahé	22	12	2	42	3	30	
Morro of San Joao, summit	22	32	26	42	1	50	
Isle Branca, or White Isle, summit	22	44	25	41	53	45	
Cape Busios, East extremity	22	46	3	41	52	54	
Ancoras Isles, the easternmost	22	46	26	41	48	0	
Papagayos Isles, the N.E. Isle	22	51	9	41	54	11	
Cape Frio, Northern summit...... ... [5]	22	59	55	41	59	45	5° 40′ W.
————, the *lighthouse*	23	0	42	41	59	50	
Cape Negro, the point.	22	57	10	42	39	5	
————, highest hill to the North ...	22	52	38	42	38	0	
Maricas, Southern Isle........................	23	1	40	42	54	0	
Raza, *lighthouse*..................................	23	3	17	43	8	20	
Redonda, or Round Isle, summit	23	3	30	43	11	0	
Nossa Senhora da Gloria, the steeple ...	22	54	42	43	10	13	
RIO JANEIRO, Imperial Observ.... [6]	22	54	10	43	10	21	
————, Sugar-loaf (1,270 ft.)...	22	57	14	43	9	12	4° 24′ W.
————, Fort Villegagnon	22	54	42	43	9	0	
————, Isle Ratos, or Rat Isle .	22	53	50	43	9	15	
————, Morro Corcovado (2,272 feet....	22	57	5	43	12	16	
La Gabia, or Gavia	22	59	0	43	17	22	
Lage de Marambaya, a flat rock	23	6	47	43	49	57	
Morro of Marambaya, summit (700 ft.)...	23	4	9	43	58	28	
Isle of Jorge Griego, S.W. point	23	13	11	44	9	6	
Ilha Grande, summit	23	8	20	44	13	47	
Point Acaya on Ilha Grande	23	10	0	44	22	12	3° 45′ W.
Point Joatinga, West extreme	23	17	30	44	29	26	
Hill of Cairoçu, Eastern summit	23	18	45	44	36	43	
Peak of Parati, summit	23	20	28	44	46	28	
Isle Couves, the largest	23	25	54	44	50	18	
Ponta Grossa..	23	27	15	45	0	44	
Isle Vittoria, summit	23	47	42	45	7	14	
Busios Isles, the S.E. Isle	23	44	47	45	0	8	
Ilhas dos Porcos, Southern hillock.........	23	33	38	45	3	42	
Islet Mar-Virado, summit	23	34	7	45	9	0	
Ponta das Ostras, extremity	23	34	52	45	12	48	
Villa Nova da Princesa, the steeple...	23	46	52	45	20	41	
Point Pirasonungo, or St. Sebastian......	23	56	32	45	12	57	2° 54′ W.
Point Sapitiba	23	56	32	45	24	30	
Montao de Trigo, or the Corn-stack	23	51	4	45	46	26	
Alcatrasses, the largest	24	6	5	45	39	11	
Santos, the Arsenal	23	55	51	46	19	49	2° 0′ W.
————, summit of the Moela................	24	3	6	46	15	31	
Point Taypu, at the entrance of Santos...	24	1	11	46	23	59	

EASTERN COAST OF BRASIL—CONTINUED.

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
Lagé de Santos	24 19 35	46 10 30	
Redonda, or Little Queimada	24 23 0	46 48 31	
Queimada Grande	24 28 21	46 40 14	
Mount Cardoz	24 58 45	48 5 5	
CANANEA, Bom Abrigo Island	25 6 49	47 51 50	0° 30′ W.
Figueira Island, centre (160 feet)	25 21 29	48 3 34	
Isle do Mel, Southern summit	25 32 43	48 19 10	
PARANAGUA, Conxas Point lighthouse [7]	25 32 30	48 18 35	
————, Fort on Isle do Mel	25 30 54	48 19 28	0° 20′ E.
————, West Point of Cotinga Isle.	25 30 30	48 30 14	
————, Church of Sta. Antonina	25 25 42	48 42 0	
Cural Rocks, the largest	25 43 49	48 23 4	
Itacolomi Rocks, the largest	25 50 20	48 25 38	
Morro Caiuva	25 49 30	48 34 22	
Point Joao Diaz, on the South side of the Rio S. Francisco [8]	26 10 15	48 32 25	
Tamborete Isles, Southern Isle	26 23 54	48 32 44	0° 30′ E.
Isles Remedios, Southern Isle	26 29 28	48 35 43	
Point Itapacoroya, Jurubatuba Point	26 45 50	48 36 5	
Mount Zambo, on the continent	27 11 6	48 33 54	
Volage Bank, 14 fathoms	26 44 0	48 7 30	
ISLE OF ST. CATHERINE AND OPPOSITE COAST [9]			
Arvoredo Isle, the summit	27 17 17	48 22 39	
FORT STA. CRUZ D'ANHATOMIRIM [10]	27 25 32	48 34 20	
San Miguel, the Church (on the continent)	27 27 15	48 38 34	
Sant' Antonio, the Church (on the island)	27 30 17	48 31 34	
Town of NOSSA SENHORA DO DESTERRO	27 35 25	48 28 52	
San José, the Church (on the continent)	27 36 18	48 33 2	
Le Ribeirao, the Church (on the island)	27 42 18	48 29 20	
Enceada do Brito, the Church	27 46 45	48 34 22	
The Isle dos Cardos	27 49 0	48 37 29	
Islet Badejo	27 26 6	48 21 12	
Isle Aranhas, the largest	27 29 42	48 21 48	
Isle Xavier	27 37 18	48 23 30	
Isle Campexe	27 42 12	48 27 50	
Moleques do Sul, the largest	27 49 10	48 26 10	
Isles Tres Irmaos, Eastern Isle	27 49 30	48 31 35	
Point Gatheta	27 35 34	48 24 36	
Point Grossa	27 47 10	48 29 42	
Point dos Frailes (Friar's Point)	27 50 0	48 30 12	
Point dos Naufragados	27 49 47	48 30 55	
Point Pinheira	27 53 8	48 31 13	
Isle do Coral	27 55 10	48 30 0	
Cape Cirui	27 58 30	48 37 46	
Cape Guaratuba	28 5 12	48 38 0	
Cape Uvidor	28 10 44	48 37 35	
Point Viraquera	28 12 25	48 36 54	
Point Bituba	28 15 5	48 36 36	
Isle das Araras, South end	28 18 0	48 35 15	
Islet Tocoromi	28 18 29	48 34 6	
Isle Lobos de la Laguna	28 22 36	48 44 0	
Morro da Barra	28 29 18	48 47 28	

EASTERN COAST OF BRASIL—CONTINUED

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
Town of Laguna	28 31 30	48 48 30	1° 10′ E.
Cape Sta. Marta Grande	28 37 30	48 49 32	1° 0′ E.
Barra Velha	28 52 30	49 18 0	
As Torres	29 19 0	49 42 45	
Praya a Pernambuco, Tramandahy	29 57 0	50 8 16	
——— d'Estreito, Eastern part	31 12 0	50 56 0	
RIO GRANDE DO SUL, the Lighthouse	32 6 40	52 7 36	4° 30′ E.
Los Castillos, the Eastern Rock (100 ft.).	34 21 0	53 45 30	6° 15′ E.

NOTES.

1. The EASTERN COAST of BRASIL, between Cape San Roque and the entrance to the Rio San Francisco, is given from the Brasilian Survey by Lieut. Vital de Oliveira. The positions in this survey accord with sufficient accuracy with those of the previous, but less complete, survey by the Baron Roussin.

The charts drawn up by the last-named expedition, however, were not of that minute accuracy which a modern survey would require, though sufficient for the general purposes of commerce. This defect has been in some measure supplied by the Imperial Brasilian Survey, before mentioned, which terminates at the Rio San Francisco.

Besides this important addition to our hydrographical knowledge, the Imperial French Government sent Captain E. Mouchez first in the steam-vessel *Bisson*, and afterwards in the steam-vessel *D'Entrecasteaux*, in 1861, with excellent chronometers, and that officer carried a chain of meridional distances between Para' and the Rio de la Plata, basing these observations on the well-determined meridian of Rio Janeiro. The longitudes, with but very few exceptions, as obtained by Captain Mouchez, are in exact accordance with those of Roussin, FitzRoy, Sabine, and others, as detailed in the previous editions of this work.

2. PERNAMBUCO.—The position of this place does not seem open to dispute; to connect it with other places, we have taken Admiral FitzRoy's observations. The difference of longitude obtained by Admiral FitzRoy, between Fort St. Pedro, Bahia, and Fort Picao, is 3° 39′ 15″; which makes the latter in 34° 51′ 48″, which varies only 5″ from the position given from Admiral Roussin, and 7″ from Capt. Hewett's determination.

Captain Mouchez makes the longitude exactly the same; and Mr. Liais, the Brasilian Astronomer, only makes a difference of 7″. As telegraphically determined by the U.S. officers in 1879, the longitude of the lighthouse is 34° 51′ 56.55″.

3. BAHIA.—The lighthouse on Fort San Antonio is 42″ W. of Fort San Pedro, to the N.W. of it, and to which place Admiral FitzRoy has referred his measurements. By several runs between Rio and this place, he has made the difference of longitude between them as 4° 37′ 51″, 4° 37′ 54″, 4° 37′ 51″, and 4° 37′ 51.5″. The mean of these is 4° 37′ 52″, which, applied to the longitude of Vilganhon Island, and the difference of longitude between Fort San Pedro and the lighthouse will place the latter in about 38° 32′ 6″, as in the Table, which is the longitude as telegraphically determined in 1879.

This point was examined with especial care by Admiral FitzRoy, who made the three passages between Rio and Bahia for its determination, with results identical in each case, or 38° 31′ 45″. It is satisfactory to state that the Brasilian astronomer,

M. Liais, in his measurement, differs only 18" from Admiral FitzRoy's observations.

The coast between Bahia and Rio de Janeiro was partially examined by Captain Mouchez, of the Imperial French Navy, in 1861. The longitudes differ considerably from those of the previous charts, especially between Sao Paulo and the Ilheos, a portion which was not closely examined before. It is necessary, therefore, to be on guard when nearing this part of the coast.

4. Abrolhos.—The difference of longitude between Sta. Barbara and Rio Janeiro, according to Admiral Roussin, is 4° 32′ 22″, while Admiral FitzRoy, with 22 chronometers, by repeated measurement, made it 4° 27′ 15″. As Admiral FitzRoy's attention was particularly directed to this difference, we take his measurement, which will place this in longitude 38° 41′ 40″, or 38° 41′ 22″, as in the Table.

Captain Mouchez made six passages between Rio and the Abrolhos; the results, combined with Admiral FitzRoy's, make the longitude 38° 39′ 12″. The latitude, by many circum-meridian altitudes of the sun, is 17° 57′ 51″, according to Captain Mouchez.

5. Cape Frio.—The Baron Roussin gives the position of the South point of the Cape as in lat. 23° 1′ 18″, long. 42° 3′ 12″; but Lieut. H. Kellett, who surveyed the harbour in 1831, has given the summit of the island in lat. 22° 59′ 54″, long. 1° 9′ 6″ East of Rio. Sir Thomas Brisbane and Mr. Rumker, in 1821, obtained the Cape Point as 41° 57′ W. In 1824, Captain Livingston made the latitude of the Saddle Gap, on the middle of the island, by a good meridian altitude, 23° 1′ 2″ S. Captain Foster makes it 1° 10′ 45″ East of Vilganhon Island, which will give for its position 41° 58′ 15″.

The old lighthouse stood on the highest point of the island; the present lighthouse is on Focinho do Cabo, on the S.E. point, or 51″ East of the former. Captain Mouchez, who took some pains to determine its longitude, because it was believed that it was placed 4 or 5 miles too far West, made it in longitude 41° 58′ 35″, by combining his own with the preceding observations. The chart places it in lat. 23° 0′ 42″, long. 41° 59′ 50″.

6. Rio Janeiro, &c.—In 1832 were published, under the authority of the Lords of the Admiralty, "Sailing Directions for the Coast of Eastern and Western Patagonia, &c., including the sea coast of Tierra del Fuego; being the result of a voyage performed in His Majesty's sloops *Adventure* and *Beagle*, between the years 1826 and 1830, under the direction of Captain Philip Parker King, F.R.S., &c.:" and, in 1836, appeared in the Journal of the Royal Geographical Society, a "Sketch of the Surveying Voyages of H.M.SS. *Adventure* and *Beagle*, commanded by Captains P. P. King, P. Stokes, and Robert FitzRoy, R.N."

Captain King's first observations on this expedition were given in the first volume of the same Journal, 1831, which detailed the operations of the two ships until their return to England in 1830.

In the autumn of this year, the *Beagle*, commanded by Admiral FitzRoy, was again prepared for a continuation of the survey, and every care and assistance was given for her equipment. At the end of 1831 she sailed from Plymouth; from which time, until 1835, she was surveying the coasts of South America, the Falkland and the Galapagos Islands. Traversing the Pacific Ocean by the way of Taheite and New Zealand, she proceeded to visit Sydney, Hobart Town, King George's Sound, the Keeling Islands, the Mauritius, the Cape of Good Hope, St. Helena, Ascension, Bahia, Pernambuco, the Cape Verde Islands, and the Azores. Meridian distances, the principal object, were carefully measured during the whole voyage. Observations for latitude, and the variation and dip of the needle, for the intensity of the magnetic influence, and upon tides, were made at each principal port. *This connected chain of good meridian distances is the first that has been carried around the world.* From 14 to 22 chronometers were employed, and the results are highly interesting. "On this expedition no life was lost, nor any serious injury sustained by any individual. Not a spar was sprung, except studding sail booms, nor a sail split till worn too long, nor a single sheet of copper lost from the vessel's bottom. The *Beagle* was so well fitted out at Plymouth Dockyard, and afterwards so supplied by direction of the Admiralty, that neither want nor deficiency ever occurred. Some of the officers and men served more than ten years in this vessel, having shared all the disagreeables of the former voyage to Tierra del Fuego, from 1826 to 1830."

Captain King, in the introduction to his Sailing Directions, has stated that "The eastern coast of Patagonia, the western part of the Strait of Magalhaen, the Gulf of Peñas, and other parts of the western coast, were surveyed by Captain Stokes, of the *Beagle*. Upon the death of that officer, Admiral FitzRoy succeeded to the command, and discovered and examined the Otway and Skyring Waters, and surveyed the outer or sea coast of Tierra del Fuego, from Cape Pillar, at the western entrance of the Strait of Magalhaen, to Cape St. Diego, on Strait Le Maire.

"The differences of meridians, between the various points of the survey, were fixed in all practical cases, by triangulation; but when this mode could not be adopted, they were ascertained by chronometric observations; the zero point (0) being the place of the Observatory at Port Famine (lat. 53° 38' 12" S.) the longitude of which was fixed at 70° 54' West of Greenwich.

"This determination was obtained principally by chronometers from Monte Video and Rio Janeiro, which agreed very closely with the mean result of a considerable number of lunar distances observed at Rio, Gorriti, Monte Video, San Carlos de Chiloe, and Valparaiso; and severally referred to Port Famine by the chronometric chain. Assuming *Villegagnon* (Vilganhon) *Island* at Rio de Janeiro to be 43° 5' 3" West of Greenwich, which is the result obtained by us with 14 chronometers from Plymouth, the longitude of Rat Island at Monte Video will be 56° 9' 30"; and of Port Famine, 70° 54' 1". The mean of the lunar observations above mentioned make the latter 70° 54' 10", when the zero point of the survey has been fixed, as above stated, at 70° 54'. Should the longitude of the station at Rio Janeiro, at some future time, be more correctly determined, all the meridional differences of this survey must be corrected by a quantity equal to the excess or defect of what it is here assumed to be."

After the publication of Captain King's operations, the fine work of Admiral FitzRoy, or rather the joint production of Captain King, Admiral FitzRoy, and Mr. Darwin, the naturalist to the latter expedition, appeared, and from which we have derived much information embodied in the following pages.

On referring to the remarks of Admiral FitzRoy upon his chronometric measurements, "forming a connected chain of meridian distances around the globe, the first that has ever been completed or even attempted by means of chronometers alone," it will be seen, that this chain exceeds the entire circumference of the earth by about 33 seconds of time, equal to 8' 15" of longitude. How this excess may affect the position of Rio Janeiro, as given by Admiral FitzRoy, we have not considered; and although the longitude we have taken is still greater than Admiral FitzRoy's, we may here say, that it is not at all unlikely that it is more to the eastward, or nearer the position assigned to it by Captain King, or as given in the former edition of this work.

In estimating the longitude of Rio Janeiro, we have brought into the calculation most of the observations that have been made, many of which would seem to be perfectly satisfactory, and yet vary from each other to a very considerable extent; yet it would seem unjust to throw them out altogether from the computation; and we have therefore thought that the best mode of procedure would be to give them entire, and from their combined result, give the longitude. This result will coincide with that assumed by Lieutenant Raper in his valuable work, and also with that of Admiral FitzRoy; the same conclusion being arrived at by different means. We shall now give the grounds upon which the longitude 41° 9′ 6″, as given in the Table, was taken. The difference between them amounts to 12′ or 14′; Roussin placing it in 43° 15′; Heywood in 43° 2′, and the British officers in 1810, as 43° 0′ only.

Admiral FitzRoy, with 22 chronometers, has given the longitude of Vilganhon Island as 43° 8′ 45″, and this result is probably very near the truth.

Lieutenant Raper has assumed the longitude of this place, from Capt. Beechey's observations of moon-culminating stars at Anhatomirim, as 43° 8′ 50″, or 43° 9′, as a secondary meridian, which very nearly agrees with the determination of Admiral FitzRoy, as above.

Upon comparing the longitudes, as found by astronomical observations, or the *absolute* position, and those obtained by the chronometer, or the *relative* position, we shall find that they very nearly coincide with that given by Admiral FitzRoy.

Now, the differences of longitude between the principal points on this coast seem to be tolerably well ascertained, and therefore it is not necessary, in fixing the position of Rio, to confine ourselves to those observations made there exclusively; we shall, therefore, first give the various longitudes as obtained by independent observation.

Captain Hewett made the longitude of Rat Island, from 11 sets of lunations (5 East and 6 West), 43° 6′ 23″. Rat Island is 43″ eastward of Vilganhon flagstaff, to which place we shall refer the measurements; this gives for the latter 43° 5′ 40″. Sir Thomas Brisbane's and Mr. Rumker's three results in August, 1821, were 43° 3′ 0″ (43° 2′ 17″), 43° 1′ 0″ (43° 0′ 17″), and 43° 10′ 15″ (43° 9′ 32″). The Portuguese astronomer, Don B. S. Dorta, by an eclipse of the sun, February, 1784, made it 43° 16′ 43″. The same eclipse, as calculated by M. Wurm, 43° 11′ 25″. Capt. King made Vilganhon Island, by lunars, in 43° 8′ 18″; and Captain Stokes, by the same means, 43° 9′. M. Wurm subsequently gave the longitude from three occultations as 43° 16′ 40″, and by the eclipse above mentioned, 43′ 10′ 55″; and from Dorta's observations, 43° 15′ 10″. Admiral Roussin, from the mean of 892 lunar distances divided into 332 series, deduces the longitude of the Sugar Loaf to 43° 14′ 20″, or Vilganhon, 43° 14′ 50″. Captain Otto Von Kotzebue, in November, 1823, from repeated observations on land, made Botafogo in long. 43° 7′ 32″ (Vilganhon, 1′ 50″ East, or 43° 5′ 42″); M. Simonov makes it 43° 7′ 17″; and Lieutenant Wainwright makes it 43° 10′ 39″. Captain Beechey calculated it by moon-culminating stars as 43° 4′ 41″, and by 158 lunars as 43° 10′ 41″; and an occultation, calculated by Faskanoff, gives it as 43° 14′ 0″.

Besides the longitudes that have been observed at Rio, there are others which may be brought into the calclulation, and among these is that of *Fort Anhatomirim*, near the N.W. point of the Island of St. Catharina. Lieutenant Raper deduces his longitude of Rio from the observations of Captain Beechey, in 1836, for fixing the position of this place: they consisted of series of moon-culminating stars, six observations, 1st limb, from 3h 14′ 15″ to 3h 14′ 29″; and five observations, 2nd limb, from 3h 13′ 36″ to 3h 14′ 34″. These observations, computed by Mr. Henderson, give 48° 33′ 54″, and another set gave 48° 34′ 47″. The difference of longitude between Anhatomirim and Vilganhon, the mean of several measurements, is 5° 25′ 3″ (see Note 10): this will give for the first computation, 43° 8′ 51″, and for the second, 43° 9′ 44″, for the longitude of Vilganhon. The longitude of Anhatomirim, by Givry and Duperrey (lunar), is 48° 40′ 47″ (Vilganhon, 43° 15′ 44″). M. Givry, on the 17th of May, 1820, at Anhatomirim, observed an immersion of Jupiter's first satellite, from which the longitude of Vilganhon may be taken 43° 12′ 30″. The longitude of *Monte Video*, by the transit of Mercury, 1789, calculated by Wurm and Triesneker, is 56° 11′ 11″; and M. Ferrer, by lunars, makes it 56° 14′ 14″; the difference of longitude between Vilganhon and Monte Video, from a mean of five measurements, is

13° 4′ 37″, which makes the former, by the first observation, in 43° 6′ 24″, and by the second, 43° 9′ 27″.

The mean of these 24 independent observations is 43° 9′ 34.1″.

At the head of those who have made *chronometric* measurements for fixing the longitudes of Rio Janeiro may be placed Admiral FitzRoy, who, with 22 chronometers, made Vilganhon Fort in 43° 8′ 45″, as before mentioned. Captain P. P. King had made it 43° 5′ 8″. Captain Owen in H.M.S. *Leven*, in 1822, by his run from Porto Praya, St. Iago, makes the longitude of Rat Island 43° 14′ 30″ (Vilganhon, 43° 13′ 47″). Captain Foster, with 17 chronometers, made Vilganhon in 43° 5′ 41″; or, according to Dr. Tiarks, 43° 8′ 12″. Captain Heywood, by his runs from St. Helena, makes Vilganhon in 43° 2′ 50″, and 43° 1′ 58″. M. Mackau, in the *Clorinde*, in 1821, makes it in 43° 14′ 2″. Admiral Roussin, by one chronometer, makes it 43° 13′ 59″.

The mean of these chronometric results is 43° 8′ 15″; and the mean of the chronometrical with the astronomical observations, as given above, will be 43° 8′ 55″: this longitude is only 10″ more than Admiral FitzRoy's, and is 5″ less than that assumed by Lieutenant Raper.

In the foregoing remarks, the observations have been reduced to Vilganhon, although many of them were determined at different points; and it will be seen that the French authorities have hitherto placed it as much to the *westward* as Captain King and others have given it to the eastward of this position. As most of the longitudes on this coast are referred to Rio Janeiro, it is of the utmost importance that this should be definitely determined.

We have before stated that Lieutenant Raper makes Vilganhon Island in 43° 8′ 50″ (5″ more than Admiral FitzRoy's determination), and finally assumes it as 43° 9′ 0″, which is 5″ less than the conclusion which is to be arrived at from the foregoing observations. Lieutenant Raper's position is deduced from Captain Beechey's moon-culminating stars at Anhatomirim; while the same observer, by the same means, at Rio, makes it only 43° 4′ 41″.

Some later assumptions of the longitude of Rio Janeiro place it somewhat more to the eastward, or Vilganhon in 43° 6′ 30″ E. But in bringing these differences to a still more rigid scrutiny, it may be fairly assumed that Admiral FitzRoy's determination, and those who coincide with him, that the longitude 43° 9′ 0″ of Vilganhon is nearly correct. This is to be inferred from the observations made in the fixed Observatories on shore, by the Brasilian astronomers, in the Imperial Observatory, and other observations of eclipses of the sun, &c. Finally, the longitude of the dome of the Observatory, as determined in 1879 by telegraphic communication with England, is 43° 10′ 21.15″; thus, Vilganhon taken as 43° 9′ 0″ W. is a very near approximation. And it may be added here, in a work belonging to sea observations, that if such refined appliances, such vast labour, and great talent, have been devoted to this problem, with such varying results, the means at the command of a ship, not specially fitted out for such operations, cannot be hoped to determine with greater certainty what has employed so much attention.

(7.) PARANAGUA.—On September 7th, 1858, the great total solar eclipse was observed here by M. Liais, of the French Imperial Observatory, and a numerous staff of scientific assistants. From the elaborate calculations resulting from this important work, the place of observation was determined to be in lat. 25° 30′ 33″ S., long. 48° 29′ 25″, but we have no notice of the exact spot.

(8.) RIO SAN FRANCISCO.—The position is that assigned by Captain Mouchez, which is the result of two measurements in the *Bisson* and the *D'Entrecasteaux*, but it is placed 2′ farther West. The longitude, as determined by Capt. Mouchez, was identical with that of Roussin, but the latitude of the latter is 4 miles in error.

(9.) ST. CATHERINE'S to BUENOS AYRES, &c.—M. Barral, on a re-survey of the Rio de la Plata, and a portion of the coast between it and St. Catherine's, assumed for his first meridian of departure, that of the Cathedral of Monte Video, taking it as 56° 13′ 4″, which he considered as perfectly settled by the observations of General Varela, by means of the passage of Mercury over the Sun's disc, on the 5th of December, 1789, and the calculations of Messrs. Triesneker and Ferrer. The differences in longitude were thence gained by 4 chronometers.

Captain Heywood, in H.M.S. *Nereus*, with accurate chronometers, made five runs between *Rat Isle*, in Rio Janeiro, and *Monte Video*, as follows :—13° 2′ 0″, 13° 5′ 12″, 13° 4′ 17″, 13° 1′ 4″, and 13° 3′ 9″, = mean, 13° 3′ 12″. Hence 43° 7′ 43″ (*Rat Island*), + 13° 3′ 12″ = 56° 10′ 55″, the longitude of the lighthouse on the Mount, which is 1′ 35″ to the westward of Rat Island. Its latitude, according to M. Barral, is 34° 53′ 2″. Captain King has also given it as 34° 53′ 2″.

The meridional difference between *Monte Video* and the Cathedral of *Buenos Ayres* is about 2° 8′ 45″. The British officers make it 2° 10′; the Spanish, 2° 7′ 30″. Its latitude is 34° 36′. As telegraphically determined in 1879, the cupola of the custom-house at Buenos Ayres is in longitude 58° 22′ 14.25″.

The Cathedral of Monte Video, on the authority quoted by Captain Owen, in his Tables, is in long. 56° 20 36″; which we conclude is 8′ or 9′ too far to the West. As determined telegrapically, in 1879, the longitude of the S.E. tower of the Cathedral was found to be 56° 12′ 15.3″, thus making the lighthouse on the Mount to be in long. 56° 14′ 50″.

Again, adverting to St. Catherine's, the difference of Messrs. Roussin and Barral in the longitudes of Anhatomirim, &c., is 5′ 58″, the greater being that of M. Roussin.

(10.) ANHATOMIRIM.—The difference of longitude between Fort Sta. Cruz of Anhatomirim and Vilganhon Island at Rio Janeiro, according to the Baron Roussin, is 5° 26′ 20″; and by another measurement, 5° 25′ 9″. Admiral FitzRoy made it 5° 25′ 45″; Captain Beechey, 5° 23′ 31″; Captain King, 5° 24′ 37″; Captain Foster, 5° 24′ 42″; and M. Givry, 5° 24′ 59″. The mean of these is 5° 25′ 3″, which, added to the longitude of Vilganhon, makes 48° 34′ 3″.

Captain Beechey's observations place it in 48° 31′ 54″; and by another computation, 48° 32′ 47″; mean, 48° 32′ 20″; which differs 25″ from Admiral FitzRoy's chronometric result.

The longitudes of the coast, between St. Catharine and the River Plate, have been adjusted by the preceding data, dependant on the new position of the Imperial Observatory at Rio Janeiro, and on Villegagnon Fort being in 43° 9′ W.

IV.—RIO DE LA PLATA TO CAPE HORN.

	Lat. S.	Long. W.	Var. 1883.
NORTH SIDE OF THE PLATE.	° ′ ″	° ′ ″	
CAPE STA. MARIA, or ROCHA, lighthouse.	34 40 30	54 7 8	6° 45′ E.
Isle of Lobos, centre	35 1 25	54 52 30	
East Point Lighthouse	34 58 0	54 57 10	
TOWN OF MALDONADO, the Tower	34 54 30	54 57 40	7° 15′ E.
Isle Gorriti, Well at N.E. end	34 56 40	54 58 30	
Ballena Point	34 55 0	55 2 30	
Punta Negra, or Black Point	34 54 21	55 15 0	
Punta d'Afila	34 47 45	55 29 10	
Punta das Piedras Negras de Sta. Rosa	34 46 30	55 40 45	

RIO DE LA PLATA TO CAPE HORN—Continued.

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
Isle of Flores; Light tower on S.W. end	34 56 55	55 55 30	7° 45′ E.
MONTE VIDEO, the Cathedral	34 54 33	56 12 15	7° 55′ E.
Isle Ratos, Monte Video [1]	34 53 0	56 13 7	
Cerro and Lighthouse of Monte Video	34 53 10	56 14 50	
Point Espinillo	34 49 50	56 25 0	
Panela Reef (marked by a lightvessel)	34 54 45	56 26 27	
Sta. Maria, or S. Gregorio Point	34 41 5	56 50 30	8° 20′ E.
Point Rosario	34 26 20	57 21 0	
Punta del Saucé	34 26 30	57 27 35	
Colonia del Sacramento, Lighthouse	34 28 14	57 51 45	8° 37′ E.
Farallon Island Lighthouse	34 29 0	57 55 40	
SOUTH SIDE OF THE PLATE.			
BUENOS AYRES, La Merced Church	34 36 28	58 22 19	9° 12′ E.
„ Custom House	34 36 30	58 22 14	
Ensenada de Barragan, fort on S. side of entrance	34 50 45	58 57 30	
Punta de Santiago	34 50 16	57 57 30	
Atalaya Point	34 54 56	57 45 0	8° 47′ E.
Magdalena, the Church	35 5 0	57 32 25	
Point del Indio (Tufted Hill, 40 ft.)	35 16 40	57 17 25	
Hillock Salvador Grande	35 21 25	57 10 30	
Point Piedras of San Boronbon	35 26 50	57 5 8	8° 37′ E.
Hillock of Juan Jeronimo	35 32 45	57 9 25	
Rio Salado, entrance	35 46 40	57 19 32	
CAPE SAN ANTONIO, North extremity	36 18 50	56 46 28	8° 45′ E.
Medanos Point, S.E. summit	36 59 5	56 39 2	8° 45′ E.
Mar Chiquito, Bar of	36 37 0	57 20 4	
Cape Corrientes, East summit	38 5 30	57 27 34	9° 35′ E.
Mount Ventana	38 11 45	61 54 37	
Point Hermeneg	38 22 40	57 50 4	
Black Point, Cliff summit	38 39 0	58 45 49	10° 25′ E.
Fort Argentina	38 43 50	62 13 0	
Mount Hermoso	38 50 50	61 38 4	
Labyrinth Head, summit	39 26 30	62 0 55	12° 10′ E.
Colorado River, mouth	39 51 40	62 2 39	
Rubia Point, S. Blas Bay, summit	40 36 10	62 6 59	
Carmen, Fort	40 48 15	62 56 25	13° 10′ E.
Rasa Point	40 52 10	62 16 34	
Negro River, Main Point	41 2 0	62 43 29	
Direction Hill, summit	40 48 0	65 8 29	
Belem Bluff, S.W. cliff	41 9 0	63 53 49	
Bermeja Head, East summit	41 11 0	63 5 49	13° 20′ E.
San Antonio Sierra, summit	41 41 10	65 10 29	14° 25′ E.
Norte Point	42 3 0	63 46 0	
Port San José, Point S. Quiroga	42 14 15	64 25 29	
Port Valdes, entrance	42 30 25	63 33 39	
Ercules Point, East cliff	42 38 30	63 32 29	13° 55′ E.
Delgado Point, S.E. cliff	42 46 15	63 34 49	
Lobos Peak	42 49 0	63 42 9	
Nuevo Gulf, Point Ninfas	42 58 0	64 17 49	14° 20′ E.
Chupat River, entrance	43 20 45	65 1 9	
Tombo Point	44 7 0	65 12 49	

RIO DE LA PLATA TO CAPE HORN—CONTINUED.

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
Santa Elena Port, Spanish Observatory	44 30 40	65 19 59	
————————, S.W. cove, Beagle's Observatory	44 32 15	65 20 49	15° 20′ E.
Port Melo, Sugar-loaf Island near	45 4 10	65 46 0	
Port Malaspina, South point	45 10 10	66 30 9	
Cape Aristazabal, S.E. pitch	45 12 45	66 29 29	
Nodales Ledge	45 43 10	67 15 39	
Tilly Road, Point Marques	45 57 0	67 32 39	16° 52′ E.
Bauza Head, summit	46 41 20	67 8 49	
Cape Three Points, N.E. pitch	47 6 20	65 49 19	16° 25′ E.
Cape Blanco, N.E. summit	47 12 20	65 41 49	
Port Desire, East Islet	47 44 40	65 47 39	16° 38′ E.
————, Ruins	47 45 0	65 53 34	
Penguin Isle, Mount at North end	47 54 45	65 43 29	
Sea Bear Bay, Beach on South side	47 56 49	65 45 49	
Shag Rock	48 8 25	65 54 45	
Watchman's Cape, Monte Video	48 18 55	66 19 49	16° 55′ E.
Bellaco or St. Estevan's Rock	48 30 50	66 11 14	
Port St. Julian, Cape Curioso	49 11 10	67 36 19	
————, Shag Island	49 16 0	67 39 51	18° 10′ E.
Cape Francisco de Paulo, extremity	49 41 18	67 35 19	
Santa Cruz, Mount at the entrance	50 8 30	68 21 0	18° 40′ E.
Broken Cliff Peak, the brink	50 14 30	68 33 4	
Lion Mount, the summit	50 20 0	68 51 19	
Observation Mount, summit	50 32 35	69 1 29	
Coy Inlet, Height on S. side of entrance	50 58 27	69 7 6	19° 20′ E.
Cape Sanches, extremity	51 6 56	69 5 19	
Tiger Mount, summit	51 21 36	69 5 18	
Cape Fairweather, extremity	51 32 5	68 57 4	
Gallegos River, Observatory Mound	51 33 21	68 58 31	19° 25′ E.
Gallegos River, North Hill	51 49 56	69 26 19	
Friars, Northern and smallest	51 49 12	69 11 49	
Friars, Southern and largest	51 50 8	69 10 39	
Convents, Northern	51 52 9	69 20 19	
Convents, Southern	51 53 1	69 18 39	
The VIRGIN'S CAPE, S.E. extremity	52 18 35	68 19 25	19° 20′ E.
Dungeness, extremity	52 22 40	68 23 29	
Mount Dinero, summit	52 18 25	68 31 39	
Cape Possession, centre	52 16 35	68 55 14	
Cape Orange, peak	52 28 10	69 27 44	19° 40′ E.
Queen Catharine Point	52 32 0	68 42 25	
Cape Peñas	53 51 30	67 31 35	19° 30′ E.
Cape St. Ines	54 8 0	67 7 5	
Cape St. Diego, extremity	54 40 35	65 3 53	18° 30′ E.
STATEN ISLAND [2]			
Middle Cape, the Rocks	54 48 20	64 43 35	18° 25′ E.
Cape South, extremity	54 51 0	64 43 55	
Cape St. Bartholomew, middle point	54 53 45	64 43 45	
Cape Colnett, the Islet	54 42 15	64 16 45	
Port Cook, Observatory mark, summit	54 45 16	64 1 0	
Port Cook, head of the Port, on the S.W.	54 46 25	64 1 0	
Cape St. John, eastern extremity	54 42 50	63 41 25	18° 0′ E.
Hole in the Wall, on the South side	54 49 20	63 53 40	

RIO DE LA PLATA TO CAPE HORN—Continued.

	Lat. S.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
Good Success Bay, North head	54 47 0	65 9 45	18° 40′ E.
Spanish Harbour, Point Kinnaird......	54 57 5	65 44 54	
Barneveldt Isles, centre	55 48 54	66 41 48	
Evout's Island, centre	55 33 0	66 42 3	
Lennox Harbour, point at North end of Beach	55 17 4	66 46 3	19° 40′ E.
CAPE HORN, South summit..... [3]	55 58 41	67 14 15	20° 15′ E.
St. Martin's Cove, head of it	55 51 9	67 31 3	
Orange Bay, middle of it..............	55 30 50	68 2 23	
Isles of Diego Ramirez:			
South or Boat Isle, summit..........	56 26 35	68 38 20	20° 50′ E.
Northernmost Rock	56 22 25	68 38 45	
Isles of St. Ildefonso, southern rock	55 53 30	69 15 15	20° 55′ E.
———————, highest summit ..	55 52 30	69 16 45	
Port Famine, in the Strait of Magalhaens ....[4]	53 40 0	70 56 0	20° 50′ E.

NOTES.

1. Monte Video.—The difference of longitude between Rat Island, Monte Video, and Vilganhon Island, according to the chronometric measurement of Admiral Fitz-Roy, in the *Beagle*, is 13° 4′ 24″. The same by Captain Foster, 13° 4′ 45″; by Capt. King, 13° 4′ 27″; by M. Barral, 13° 4′ 21″; and in the *Beagle*, in 1830, 13° 4′ 30″. The mean of these meridional differences, which so nearly coincide, is 13° 4′ 29″, which we have taken, and which, added to 43° 9′ 0″, the longitude of Vilganhon, gives the longitude as about 56° 13′ 30″.

The observations that have been made for determining the position astronomically, also, very nearly agree with this result. One was made by M. Ferrer, from the passage of Mercury, in 1787, as 56° 13′ 30″; and a similar observation by Triesneker, in 1789, made it 56° 12′ 6″, or, as calculated by Ferrer, in 56° 13′ 36″. (See Note 6, pp. 16—19.)

Captain Mouchez, also, in 1861, had several sets of observations to determine its longitude; these were referred to the Custom-house, which is 1′ 4″ E. from Ratos Island. Some of these were made in the *D'Entrecasteaux*, November and December, 1861, and to these were added those made by the chronometers of the steamer *Saintonge*, of the Imperial Mail Packet Service. These chronometers were carried backward and forward in six voyages to Rio and Buenos Ayres, where they were compared with the excellent astronomical clock at the Observatory of Messrs. Daviet and Jaggley. The mean of the whole of these series of observations makes the Custom-house at Monte Video to be in longitude 56° 10′ 8″, or Ratos Island, 56° 11′ 12.7″ W. As determined by telegraph, its longitude is about as given in the Table. (See Note 9 in previous Section).

2. Staten Island.—This island was accurately and completely surveyed by Lieutenant E. N. Kendall, of H.M.S. *Chanticleer*, in 1828. The positions are those of Admiral FitzRoy.

3. Cape Horn.—The longitude of the summit of this Cape is stated in Captain King's Tables as 67° 10′ 53″ (= 67° 14′ 53″), and in Admiral FitzRoy's Tables as

67° 16′ 0″ (= 67° 16′ 15″), which, as the distance from Port Desire, as run by the *Beagle*, in 1832, was found to be 1° 20′ 40.5″, we have placed it in the Table according to this result.—(See also Captain King's Tables, p. xiii.) But it may be remarked, that taking Port Famine as 4′ more than Captain King's position (see next Note), it will still bring it 1′ 22″ East of Admiral FitzRoy's. We have not attempted to reconcile this difference: the remainder of the coasts of Tierra del Fuego are according to Captain King's determination.

4. Port Famine.—The Observatory at this place is the zero point of the surveys of Captain King, and which he places in 70° 54′ West of Greenwich, assuming Rio Janeiro to be in 45° 5′ 3″ West.—(Sailing Directions for Patagonia, &c., Introd., p. vii.) But as we have taken the latter as 3′ 57″ West of this, it would make it in 70° 57′ 57″. Captain King, by several runs, makes the meridional difference between Monte Video and Port Famine as 14° 44′ 31″; this, added to the longitude of the former place, would make it 70° 56′ 46″. Lastly, Admiral FitzRoy makes 5° 2′ 20″, as the difference between it and Port Desire; this gives 70° 57′ 54″. It will, therefore, be sufficiently near to assume it as 70° 56′ 0″, which is 2′ West of Captain King, and 15″ West of Admiral FitzRoy's determination. The positions of Tierra del Fuego are those of Captain King, with the addition of 2′ to the longitude.

V.—COAST AND ISLANDS OF AFRICA, FROM THE RIVER GALLINAS TO CAPE LOPEZ.

	Lat. N.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
River Gallinas, entrance ....[1]	7 0 1	11 38 5	20° 0′ W.
Cape Mount (1,066 ft.), southern peak ..	6 43 0	11 21 9	
St. Paul River, entrance	6 23 0	10 48 45	
Cape Mesurado, lighthouse on extr. ..	6 19 15	10 49 20	
Monrovia, Government house	6 19 1	10 48 45	
Grand Bassa, Agent's House	5 54 50	10 4 5	
River Sestros, or Grand Cestos, Factory on St. George Point	5 26 25	9 34 45	
Baffou Point	5 9 10	9 17 30	
Bloo Bara, or Barbarra Factory	4 59 15	9 2 5	
Middle Neefoo, or Niffou	4 45 3	8 33 2	
Cape Palmas, lighthouse	4 22 9	7 44 16	20° 0′ W.
Tabou River, Tafou Point	4 24 47	7 21 30	
Grand Bereby	4 39 3	6 54 30	
St. Andrew's River, King George's Town, within Swarton Corner	4 57 45	6 3 47	
River Fresco, or Rio de Lagos, mouth ..	5 5 0	5 33 30	
Grand Lahou, East end	5 8 40	4 57 10	19° W.
Jack Jaques	5 11 40	4 26 8	
Assinee River, mouth	5 8 45	3 23 7	
Apollonia	4 58 45	2 35 5	
Axim, Fort St. Anthony	4 52 18	2 14 45	
Cape Three Points, lighthouse	4 44 50	2 5 40	18° 30′ W.
Acquidah	4 45 27	2 2 8	
Dixcove	4 47 45	1 56 40	
Elmina, or St. George del Mina	5 5 0	1 20 15	
CAPE COAST CASTLE, lighthouse on Fort William	5 6 25	1 13 51	18° 10′ W.

COAST AND ISLANDS OF AFRICA—Continued.

	Lat. N.	Long. W.	Var. 1883.
	° ′ ″	° ′ ″	
Mauree, or Moree, flagstaff	5 7 30	1 11 15	
Anamaboe, flagstaff	5 10 12	1 6 30	
Cormantine, flagstaff	5 11 30	1 4 56	
Tantumquerry, flagstaff	5 13 15	0 47 18	
Mamquady or Devil's Hill, summit	5 19 30	0 39 30	
Barracoe, point	5 23 0	0 28 15	
ACCRA, light on West bastion of Fort James	5 31 53	0 11 30	
		Long. E.	
Ningo, fort	5 44 30	0 11 48	
Volta River, entrance	5 46 0	0 41 30	17° 30′ W.
Cape St. Paul, near Wyee	5 49 45	0 58 30	
Quitta, flagstaff	5 54 48	0 55 50	
Little Popoe, road	6 12 30	1 36 0	
Great Popoe	6 16 0	1 52 0	17° W.
Whydah, or Ajuda	6 19 0	2 4 30	
Appi, or Cutanu	6 21 30	2 25 30	
Porto-Novo, Table-top trees	6 23 0	2 35 0	
Porto-Novo, road	6 19 15	2 35 30	
Badagry, shore hut	6 24 10	2 53 5	
Badagry, road	6 23 0	2 53 0	
LAGOS RIVER, entrance	6 26 0	3 26 0	
Benin River, North point [2]	5 46 0	5 3 0	
Rio dos Esclavos, or Escardos, N. point	5 35 15	5 10 48	
Middleton River, entrance	4 31 0	5 40 0	
Sengana River, entrance	4 19 0	5 58 30	
River Nun, or Quorra, or Niger, the Bar	4 16 0	6 4 30	16° 25′ W.
Rio Bento, or Brass River, East point	4 17 0	6 15 0	
Rio St. Nicholas, or Third River	4 18 0	6 24 0	
New Calabar River, Foche Point	4 22 40	7 1 30	
Bonny River, Rough Corner	4 23 40	7 7 30	
Opobo River, West Point South beacon	4 27 22	7 33 21	
Old Calabar River, Tom Shot's Point	4 36 0	8 20 0	15° 45′ W.
Backasey Gap, East of the entrance	4 29 0	8 32 0	
Cape Bimbia	3 57 0	9 15 48	
Cape Camaroons	3 55 0	8 54 30	
Camaroons Mountain, peak	4 13 0	9 12 0	
Rumby Mountains, highest peak	4 57 0	9 18 0	
Qua Mountain	5 15 0	8 51 0	
Cape St. John	1 9 40	9 21 55	
Corisco Island, N.W. point	0 55 54	9 19 45	16° 30′ W.
Cape Esterias	0 37 48	9 21 0	
Gaboon River, Cape Joinville or Point Santa Clara	0 30 30	9 20 30	
Gombé Point, or Round Corner	0 18 5	9 20 0	
Cape Lopez, or Lopo Gonçalves	0 36 12S.	8 43 27	17° 0′ W.

AFRICAN ISLANDS.

	Lat. N.	Long. W.	Var. 1883.
FERNANDO PO:			
Clarence Peak	3 35 0N.	8 46 30	15° 50′ W.
Cape Bullen, Northern extremity	3 47 45	8 43 0	
Adelaide Islet	3 46 15	8 47 17	
Point Fernandina or William, light-ho.	3 45 20	8 47 38	

COAST AND ISLANDS OF AFRICA—CONTINUED.

	Lat. N.	Long. E.	Var. 1883.
	° ′ ″	° ′ ″	
AFRICAN ISLANDS—continued.			
FERNANDO PO—continued.			
Cape Horatio, N.E. extremity	3 46 15	8 56 0	
Cape Vidal, East extremity..........	3 39 18	8 56 48	
Cape Barrow, South Rock	3 13 0	8 43 30	
Cape Eden, S.W. extremity	3 19 0	8 27 6	
Cape Badgley, West extremity	3 21 12	8 24 42	
Charles' Folly Pta. S. Carlos)	3 28 50	8 29 58	
Goat Isle (Isle das Cabras), centre....	3 32 50	8 34 36	
ILHA DO PRINCIPE, OR PRINCE'S ISLAND:			
Ilheo do Diamante	1 40 42	7 27 54	16° 40′ W.
Santo Antonio Bay, Fort Sta. Anna ..	1 39 30	7 26 30	
Ponta Piconegro	1 32 10	7 24 25	
Pedras Tinhosas, or the Brothers, S. one	1 21 10	7 17 30	
SAN THOME', OR ST. THOMAS ISLAND:			
Ponta do Figo	0 24 0	6 35 28	17° 20′ W.
Cabras Island......................	0 24 10	6 41 31	
Anna de Chaves Bay, Fort S. Sebastiao	0 20 30	6 42 38	
Ponta da Balea	0 0 45	6 29 42	
Ponta Furada	0 13 50	6 25 49	
Ilheo das Rolas, centre..............	0 0 30 S.	6 30 0	
ANNO BOM:			
Ilheo da Tartaruga, or Turtle Island..	1 24 28	5 38 10	18° 10′ W.
Point Esteves	1 24 50	5 35 35	
Fernando Po Rock, off South Point ..	1 28 35	5 36 45	

NOTES.

1. **WINDWARD AND GOLD COASTS.**—In a former edition of this work it was endeavoured to investigate, by comparison, the longitude of the different points between Sierra Leone and the Bight of Biafra; which was so far successful as to prove the existence of very material errors in some works of repute then in general use.

In February, 1822, H.M.S. *Leven*, with the sloop *Barracouta*, left England, under Admiralty orders, for the purpose of surveying the whole of the Eastern and the greater portion of the Western Coasts of Africa. These vessels proceeded in the first instance to Rio Janeiro, and there the observations were made which have been alluded to in the preceding notes. On the 9th of June they left Rio, and thence proceeded to the survey of the Bays and Cape of Good Hope, and the shores of the Indian Ocean.

The dreadful mortality which subsequently attended this expedition was almost unprecedented, but the survey was continued with undaunted perseverance; and, at length, the Eastern Coast of Africa, with the Ethiopian Archipelago, including Madagascar, having been completed, the ships returned to the Cape of Good Hope in November, 1825: and from this place a *track survey* of the Western Coast commenced, which terminated at Sierra Leone, and was completed in January, 1826.

But there still remained for examination a considerable portion of the *Windward* and *Gold Coasts;* and this deficiency was in some measure supplied by Captain Owen's second voyage, in H.M.S. *Eden*, in 1827, corroborated by remarks made, nearly at the same time, in H.M.S. *Esk*, commanded by Captain Purchas, and which were, in many instances, accordant, as shown in the Errata and Additions to Captain Owen's Tables, published by authority in 1829.

The survey of the Windward and Gold Coasts was completed by Captain Vidal and his coadjutors, in H.M.SS. *Etna* and *Raven*, during the year 1838, their work terminating at Corisco Bay, to the South of the Bight of Biafra. A portion of Captain Vidal's positions is given in the Table. The coast between Cape St. Paul and Cape Formoso was also surveyed by Captain Denham, R.N., in 1846.

2. River Benin.—The entrance of this river was surveyed, in 1826, by Captain Vidal, and the officers of H.M. sloop *Barracouta;* and hence eastward and southward all the coast has been surveyed by various officers of the Royal Navy.

VI.—THE COAST OF AFRICA, FROM CAPE LOPEZ TO THE CAPE OF GOOD HOPE, ETC.

	Lat. S.	Long. E.	Var. 1883.
	° ′ ″	° ′ ″	
Cape Lopez, or Lopo Gonçalves, North extremity	0 36 12	8 43 27	17° 0′ W.
River Mexias, North point of entrance	0 53 0	8 51 0	
River Fernan Vas	1 15 0	9 0 26	
Point Santa Catharina	1 51 0	9 15 0	
River Sette, entrance	2 23 30	9 30 36	
Pta. Pedras	2 48 0	9 57 30	
Cape Yumba or Mayumba	3 15 0	10 34 0	17° 30′ W.
Point Matooti	3 22 42	10 37 28	
Point Banda	3 55 30	11 1 0	
Point Kilongo	4 16 30	11 21 6	
Indian Point	4 40 0	11 44 36	
Black Point	4 49 0	11 48 26	
Point Malemba	5 18 30	12 8 0	
Kabenda Bay, Point Palmas, or Kabenda Hook	5 32 0	12 9 0	
Red Point	5 44 0	12 6 0	
Congo River, Shark Point	6 4 36	12 16 30	18° W.
———, Cape Padrao	6 8 0	12 13 45	
Mangal Grande Wood	6 39 0	12 30 56	
Funta Bay, North Point	6 56 30	12 46 26	
Cousa or Couza River	7 12 0	12 52 30	
Ambrizette, factories in Juma Bay	7 18 0	12 56 30	
Aravat Mountains, Granite Pillar	7 36 40	13 3 36	
Kinsembo or Ambrizette Point	7 41 0	13 2 0	
Ambrizette Villages	7 44 0	13 3 30	
Ambriz Bay, Strong Corner	7 53 0	13 7 25	
Masula Bay, Mouth of Onzo River	8 14 0	13 14 50	18° 50′ W.
Cape Dandé	8 28 0	13 17 30	
Cape Spilimberta	8 36 0	13 18 0	
Cape Lagostas, Lighthouse	8 46 0	13 17 0	
Loanda Island, North Point	8 47 0	13 13 55	
St. Paul de Loando, Town flagstaff [1]	8 48 6	13 12 27	19° 5′ W.
Point Palmarinhas	9 7 10	13 2 5	
Coanza River, Molli, or North Point	9 20 0	13 12 25	
Black Rocky Point	9 34 15	13 16 0	
Cape Ledo, extreme	9 46 0	13 17 20	

THE COAST OF AFRICA—Continued.

	Lat. S.	Long. E.	Var. 1883.
	° ′ ″	° ′ ″	
Cape San Bras, or St. Blaize, extreme ..	10 1 30	13 21 50	
Rio Longo, North Point	10 19 30	13 34 50	
Old Benguela Head	10 47 30	13 44 30	
Rio Cubo, entrance	10 53 0	13 51 20	
Novo Redondo, the Fort	11 8 0	13 54 10	
Quicombo Point	11 19 0	13 51 16	
Whale's Head	11 36 45	13 49 30	
Rio Tapado, or Egito	11 48 0	13 50 0	
Rio Logito..........................	11 59 15	13 47 30	
Lobito Point	12 20 0	13 35 0	
San Felippe de Benguela, Fort flagstaff ....[2]	12 33 55	13 23 42	21° 25′ W.
St. Philip's Bonnet	12 34 24	13 19 30	
Point San José	12 35 50	13 14 0	
Salinas Point, extremity	12 53 30	12 58 30	
Loacho or Luash Harbour	12 56 0	13 2 0	
Camena or Equimena Bay	13 9 30	12 55 30	
Elephant Bay, Friars' Point	13 13 0	12 50 15	
Cape St. Mary, or Sta. Maria..........	13 25 30	12 37 40	
Cape St. Martha	13 54 0	12 28 30	22° 25′ W.
Das Matilhas Bay....................	14 3 0	12 25 30	
Tiger Bay	14 11 0	12 24 15	
Mount do Velho	14 26 30	12 23 0	
Point Sta. Gertruda..................	14 49 30	12 13 30	
Mossamedes Bay, Point Euspa	15 6 30	12 11 0	
Cape Negro, pillar	15 40 30	11 58 50	23° 30′ W.
Port Alexander, Sandy Point	15 47 30	11 53 0	
Point Albina	15 54 0	11 47 0	
Great Fish Bay, Tiger Point	16 30 0	11 46 10	
River Nourse, entrance	17 15 0	11 49 45	
Cape Frio, extreme	18 24 0	12 2 30	25° W.
Fort Rock Point	19 6 0	12 39 0	
Swallow Breakers	20 6 0	13 6 0	
Cape Cross, or Sierra	21 50 0	13 56 50	26° 10′ W.
Rocky or Da Serra Bay, Sierra Point ..	21 56 30	14 4 0	
Walvisch Bay, Pelican Point ......[3]	22 53 0	14 27 10	
Sandwich Harbour, or Porto d'Ilheo, store-house on Lagoon Point	23 20 45	14 31 3	
Bahia de la Conceiçao	24 0 0	14 32 30	
Hollam's Bird Islet	24 37 30	14 32 0	27° 25′ W.
Spencer Bay, Mercury Island, summit ..	25 42 40	14 51 18	
Hottentot Bay, Hottentot Point	26 7 0	14 57 50	
Ichaboe Island, North extreme	26 17 0	14 57 25	
Marshall Rocks......................	26 21 0	14 59 0	
Angra Pequena ; Diaz, or Pedestal Point	26 37 52	15 7 7	28° 5′ W.
Elizabeth Point......................	26 52 0	15 10 0	
Bol Islet....	27 0 30	15 13 0	
Possession Island, South Point	26 58 30	15 12 27	
Whale Bay	27 22 30	15 22 30	
Angras Juntas	27 47 0	15 35 0	
Orange, or Gariep River, Dry Bar	28 38 0	16 27 20	28° 30′ W.
Cape Voltas	28 42 0	16 32 0	
Port Nolloth, South beacon............	29 15 50	16 52 20	
Buffels or Koussie River	29 40 30	17 3 0	
Hondeklip Bay, Dog Stone............	30 19 10	17 16 25	

THE COAST OF AFRICA—Continued.

	Lat. S.	Long. E.	Var. 1883.
	° ′ ″	° ′ ″	
Roodewall Bay, North Point	30 27 12	17 20 50	
Olifant River	31 42 0	18 11 25	
Donkin Bay, South Point	31 56 0	18 16 0	
Cape Deseada	32 19 0	18 19 0	
St. Helena Bay, Shell Bay Point	32 42 12	17 58 0	
Castle Cape	32 49 40	17 50 48	
Saldanha Bay, North point of entrance	33 3 12	17 54 40	
Dassen or Coney Island, centre	33 25 30	18 5 30	
Robben Island, Minto Hill lighthouse	33 48 52	18 22 33	
Table Bay, Green Point lighthouse	33 54 5	18 24 5	
————, Cape Town, Castle flagstaff	33 55 12	18 25 53	
————, Devil's Berg, the peak	33 57 12	18 25 39	
CAPE TOWN, Observatory and Time-ball	33 56 3	18 28 45	30° 5′ W.
———— in time 1h 13m 5·0s			
———— in Greenwich time, p.m., 11h 46m 55·0s			
Hout Bay, York Point	34 3 25	18 20 0	
Cape of Good Hope, lighthouse....[4]	34 21 12	18 29 30	30° 15′ W.
————————, Bellows Rock	34 23 48	18 29 50	
False Bay, Roman Rocks lighthouse	34 10 45	18 27 30	
————, Simon's Bay, time signal	34 11 30	18 25 48	
Cape Hangklip, or False Cape, extreme	34 23 30	18 50 0	
——————, pile on hill	34 22 15	18 50 5	
Point Mudge, extremity	34 25 12	19 8 35	
Danger Point, South extremity	34 38 0	19 18 0	
Dyer Island, centre	34 41 0	19 25 10	
Quoin Point, extremity	34 46 45	19 38 30	
Cape Agulhas, lighthouse	34 49 45	20 0 40	30° 20′ W.
Struys Bay, Struys Point, beacon	34 41 24	20 14 10	
Cape Infanta, extremity	34 27 55	20 52 12	
Kaffir Kuyl Bay, Morris Point	34 23 35	21 26 50	
Cape Vacca	34 20 12	21 55 0	
Flesh Point, extremity	34 17 50	21 56 50	
Cape St. Blaize, lighthouse	34 11 10	22 9 31	30° 5′ W.
Knysna River, entrance, East point	34 4 50	23 4 0	
Plettenberg Bay, Delgado or Seal Cape, extremity	34 6 20	23 25 0	
Cape St. Francis, extreme	34 11 40	24 52 20	
Algoa Bay, Cape Recife lighthouse	34 1 43	25 42 12	
————, Coega or Kuga Riv., entrance	33 47 35	25 42 0	
————, Sta. Cruz I., peak	33 47 50	25 46 30	
————, Bird Island, lighthouse	33 50 27	26 17 13	
Padrone Point, extreme	33 46 20	26 28 0	29° 30′ W.
Port Alfred, Kowie River, entrance, signal staff	33 36 9	26 54 10	
Great Fish Point, extreme	33 31 20	27 7 0	
———— River, mouth	33 29 40	27 8 30	
Keiskamma River, S.W. point of entr.	33 16 48	27 29 40	

NOTES.

1. St. Paul de Loanda.—The town flagstaff, according to Captain W. Owen, is 5° 12′ 12″ W. from the Devil's Peak, or in long. 13° 14′ 24″. Between the same place

and Ascension the meridian distance is 27° 45′ 48″, which will place it in 13° 10′ 30″, a considerable variation from the former one; the mean of them is 13° 12′ 27″.

2. BENGUELA.—The meridian distance between the fort flagstaff at Benguela and the Devil's Peak at the Cape of Good Hope, is 5° 1′ 30″, according to the measurement made in a short run in the *Leven* and *Barracouta*, in 1825. This will place Benguela flagstaff in 13° 25′ 6″. Captain Heywood measured the meridian distance between St. Helena and Benguela flagstaff as 19° 6′ 18″, which will place the latter in 13° 22′ 18″. The mean of these two will be 13° 23′ 42″, as in the Table, but it is probably 2′ or 3′ more to the eastward.

3. In 1880 Commander P. Aldrich, H.M.S. *Sylvia*, determined the longitudes of the principal anchorages between Walvisch Bay and Orange River, by means of 7 chronometers from the Cape of Good Hope.

4. TABLE BAY and the CAPE OF GOOD HOPE.—The Observatory at Cape Town and the *time ball* in front of it, are described hereafter. The observations for determining its position were commenced by the lamented Rev. Mr. Fallows, in 1829-30. Mr. Henderson, his successor, finally determined its longitude, as stated below. Upon this important place most of the positions on the East and West Coasts of Africa depend; and therefore the corrections applied to it have been extended to those places in connection with it.

Captain Owen, the surveyor of these coasts, said:—"At the Cape of Good Hope we were first required to exercise that precision and care upon which the whole value of our future work was to depend. This point was made the first meridian, from which to date all our longitudes. But even here, perhaps the most frequented and prominent cape in the world, considerable discrepancies were found to exist in its reputed situation. Some of the most established authorities had placed it in a longitude from 11′ to 8′ eastward of our observations. The most critical remarks of the late astronomer, the Rev. F. Fallows, had, however, reduced that difference to 3½′ of longitude; but as our observations agree in every particular with those of the indefatigable Maskelyne and De la Caille, there is still much reason to place full confidence in our results, as published by the Admiralty, in a Table of Latitudes and Longitudes determined by Captains Owen and Vidal."—(Vol. II., p. 377.)

Here we are under the necessity of pointing out that Captain Owen was not so correct as he imagined. The Observatory has been since finally settled by Mr. T. Henderson, the resident astronomer, who gave its situation as 33° 56′ 3″ S., and 18° 28′ 45″ E. From this deduct 2′ 52″ (*diff. long.*), and it gives the citadel flagstaff in 18° 25′ 53″, or 4′ 53″ E. of Captain Owen. This is very nearly the same as we formerly gave it from Captain Heywood.

SECTION II.

GENERAL OBSERVATIONS ON THE WINDS, TIDES, AND CURRENTS; AND ON THE DIFFERENT PASSAGES OVER THE SOUTH ATLANTIC OCEAN.

1.– GENERAL REMARKS ON THE WINDS.

(1.) In order to give a proper account of the meteorology of the South Atlantic Ocean, or of any similar area, it is necessary to take a wider range to embrace those natural influences which cause the peculiarities of each region. Of late years this important subject has received much greater attention, and more exact observation has been imported into it than in former times, when vague speculation and inconclusive arguments were deemed sufficient to determine the practical application of the motions of the aerial and marine currents to the purposes of navigation.

But even now we cannot affirm that the absolute truth is arrived at, and very many important points, more interesting to the scientific enquirer than to the seaman in his vocation, remain totally unsolved. To pursue these enquiries, however interesting, would be out of place here. But a few general remarks on the circulation of the atmosphere may be useful as a preliminary to the descriptions of the various general and local winds which are met with in the South Atlantic. This has been done in our volume on the North Atlantic Ocean; and as it is desired that this work, though supplementary to that, should be complete in itself, a portion of these remarks are inserted here.

(2.) As a broad and primary principle, it may be affirmed, the complete circulation of the atmosphere, by which any particle of the air has in its course passed over every portion of the earth's surface, is demonstrated by the fact that the air is composed of precisely the same elementary constituents in every part of the world. This fact was experimentally demonstrated by the French Academy of Sciences many years since, who had bottles of air most carefully collected in all regions, and submitted to the most rigid analysis, which failed to discover any difference whatever. It is manifest in a natural sense also, by its supporting animal and vegetable life universally in the same manner. If it were not so, the air which existed over a special region would, in the course of ages, have become subject to the emanations and influences of the earth it covered. The same remark holds good, also, with the water of the ocean, equally universal in its definite characteristics, and from the same cause, as wlll be shown hereafter. The manner in which this is carried on is still involved in some mystery, although these difficulties are disappearing before the rigid investigations which are now pursued and applied to each new fact as it arises.

(3.) In the year 1686, Edmund Halley* proposed the theory of the Trade Winds and Monsoons, which is now generally received as an approximation to the true solution. He afterwards altered his views, which were revised and extended by George Hadley in 1735.† The following is a brief summary of them:—

(4.) The sun is constantly vertical over some part of the earth between the tropics, and this zone is consequently maintained at a much higher temperature than the regions nearer the Poles. This heat on the earth's surface is imparted to the air, which is, therefore, displaced and buoyed up from the surface, and the colder, and therefore heavier, air from without glides in, on both sides, along the surface; while the displaced air, thus raised above its due level, and unsustained by any lateral pressure, flows over, as it were, and forms an upper current in the contrary direction, or towards the Poles; which being cooled in its course, and also sucked down to supply the deficiency in the extra-tropical regions, keeps up thus a continual circulation.

Since the Equator revolves much more rapidly than the portions nearer the Poles, it follows, that a mass of air flowing towards the Equator must be deficient in rotary velocity, and, therefore, unable to keep up with the speed of the new surface over which it is brought. Hence these currents from the North and South must, as they glide along the surface, at the same time lag or hang back, and *drag upon* it in the direction *opposite* to the earth's rotation, *i.e.* from East to West. Thus, from simple northerly and southerly winds, they become permanent *north-easterly* and *south-easterly winds*.

The lengths of the diurnal circles increase very slowly near to the Equator, and for several degrees on each side of it hardly change at all. It follows from this, then, that as these winds approach the Equator, their easterly tendency must diminish: and at the Equator must be expected to lose their easterly character altogether. And not only this: but the northern and southern currents, here meeting and opposing, will mutually destroy each other, leaving only the actions of local causes, which may lie in one region in one way, and in another in a different one.

The result of this, then, is the production of two great tropical belts of north-easterly and south-easterly winds, while the winds in the equatorial belt which separate the two former should be free from any steady prevalence of an easterly character, and should also be comparatively calm. All these consequences are agreeable to observed fact, and constitute the system of the regular *trade winds*.

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* Philosophical Transactions, xvi., 153.

† Ibid., 1735, p. 58.

(5.) The constant friction of the earth upon the air near the Equator, it may be objected, would, by degrees, destroy the rotation of the whole mass; but it is compensated in this manner. The heated equatorial air, rising and flowing off toward the Poles, carries with it a rotatory velocity much greater than that of the surface over which it passes in its northward and southward progress. Hence it will gain more and more on the surface of the earth, and assume more and more a *westerly* relative direction; and when, at length, it necessarily returns to the surface in its circulation, which it must do, more or less, in all its course, it will act on it by its friction as a powerful S.W. wind in the northern hemisphere, and a N.W. wind in the southern, and thus restore the equilibrium. This is the origin of the S.W. and westerly gales so prevalent in our latitudes, and of the almost universal westerly winds in the North Atlantic.[*]

(6.) Now it will be seen that, by this theory, the trade winds *meet* near the Equator, leaving a belt of calms of various breadth between them. According to Commander Maury, the winds here being neutralized rise up and *cross each other;* the wind brought by the S.E. trade passing over the N.E. trade as a S.W. upper current; and, having passed the calms or variables of the Tropic of Cancer, it appears as the ordinary anti-trade or S.W. prevalent wind. The chief physical fact upon which this theory is based is the red dust, found frequently to fall on vessels near the Cape Verdes, and in the Mediterranean, where it is called scirocco dust (as coming from the South). This red dust was found by Ehrenberg to consist of microscopic infusoria and organizations, whose habitat, *as far as was known*, is in South America. But this argument may be demurred to from the limited extent of the area upon which this dust falls compared with the vast area from which it is said to be derived.

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[*] Sir John Herschel gives the following note in his work upon the origin of storms, which, as it is most feasible, we give here; it must be observed, that it was written before the views and observations of Reid, Redfield, and others had been published. We shall advert to it hereafter.

"It seems worthy of inquiry, whether hurricanes in tropical climates may not arise from portions of the upper currents prematurely diverted downwards before their relative velocity has been sufficiently reduced by friction on, and gradually mixing with, the lower strata; and so dashing upon the earth with that tremendous velocity, which gives them their destructive character, and of which hardly any rational account has yet been given. Their course, generally speaking, is in opposition to the regular trade wind, as it ought to be, in conformity with this idea.—(*Young's Lectures*, i. 704.) But it by no means follows that this must always be the case. In general, a rapid transfer, either way, in latitude, of any mass of air which local or temporary causes might carry *above the immediate reach of the friction of the earth's surface*, would give a fearful exaggeration to its velocity. Wherever such a mass would strike the earth, a hurricane might arise; and should two such masses encounter in mid-air, a tornado of any degree of intensity on record might easily result from their combination."—*Astronomy*, p. 132. The more recent views of Sir John Herschel will be found in their place hereafter.

(7.) There is another great difficulty in the reception of the theory that these currents cross each other, in the great breadth, in some parts, of the intervening band of calms. In the eastern part of the Atlantic, it is from 300 to 600 miles in breadth. If this great interchange of directions were continually going on with such a vast amount of atmosphere, we may safely conclude that the lower strata would not be characterized by the calms or "doldrums" they are known by.

(8.) The more reasonable argument, in the present state of our knowledge, is, that the trade winds reaching this belt of calm, by far the greater part of this indraught will rise on its own side, and revert towards the pole of its own denomination in a precisely opposite direction to that by which it arrived. In the parts of the equatorial regions, where this intervening calm belt is much narrower, as on the East coast of America, this crossing may take place, and the upper currents pass on towards the Poles of *contrary* names. At all events, this view of the circulation of the atmosphere will satisfy our first proposition—that every particle of air has been so commingled with the rest, that it produces the universality of character which is demonstrated to exist. These theories are practically unimportant to the sailor in his profession, but are highly interesting* to him as a subject of observation and reflection.

It has been held by many that the solar heat, combined with the revolution of the earth, is sufficient to account for the general phenomena of the winds; but there are still some difficulties in the way of accounting for some of the periodical winds which are found to recur with great regularity. This has been reasoned for by Mr. Hopkins, who argues that the trade wind at times blows towards areas of great condensations; in other words, that a great rain-fall occasions a corresponding indraught.† Another agent in giving the easterly direction to the trade winds, is suggested by Commander Maury to be Magnetism; but this subject, of the magnetism of the air and the influence of the solar heat on it, is as yet hidden too much in obscurity to draw any certain deductions therefrom.

It is also contended by some that the lowest stratum of the air, having its velocity kept down by friction, generally moves from the tropical belts of high barometer to the regions of low barometer at the Poles and Equator. Thus, the N.W. and S.W. anti-trades constitute *under* currents toward the Poles beneath a topmost current, also toward the Pole and a middle return or compensating current; and that the crossing of the winds at the tropic is a physical impossibility.‡

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* See further on these subjects, Maury's "Physical Geography of the Sea," 1860, pp. 149, 175. Sir John F. W. Herschel, Ency. Brit., xviii. 577. Captain Basil Hall "Fragments of Voyages and Travels," 2nd series, i. 162.

† Mr. Hopkins: "The atmospheric changes that produce Rain and Wind:" also see Journal Royal Geog. Soc., 1856, pp. 158, et seq. See also D. Vaughan, U.S., in British Association Report, 1860, p. 41. This view of Mr. Hopkins is modified by other observations which will lead to the inference that currents of air move *around* areas of high or low pressure, the condition being that which usually attends the greatest rain-fall.

‡ See Professor J. T. Thomson, in Report of British Association, 1857; and Professor J. D. Everett, in the same Journal, 1871, p. 64.

Another view of the cause of atmospheric circulation is that by Professor Laughton, of Portsmouth, who contends that it is due to aëro-tidal or mechanical causes.

He supposes that the prevailing westerly wind of high latitudes is caused by the influence of the moon, and that the modifications of this wind, caused by the coasts which bound the sea, are the sources of all other winds. For instance, he says when our westerly wind strikes the coast of Portugal, it will branch to the North and South as any fluid would do under similar circumstances, and that eventually it will recurve to the westward to fill up the space from which the air forming the original westerly wind, had moved. Thus eddying, as it were, in two great circuits, and carrying the surface waters with it, causing the main currents of the ocean.*

There can be no doubt that land frequently offers an obstruction to a current of air, and diverts its course, but this theory does not take into account the changes which come with the seasons; they seem to be due to temperature.

(9.) There is one feature of the atmosphere which has been involved in some obscurity, or, at least, has been the subject of controversy. It is the condition of *aqueous vapour*, at all times present in the air. It is a very important question, as upon this water-bearing property of the air, evaporation, condensation, and rain depend, and consequently climate and fertility to the earth. The doubts may be briefly stated. The eminent chemist, Dalton, demonstrated that one gas (and aqueous vapour is such) could permeate or exist in connexion with another gas without displacing its bulk, and that water was thus diffused through the atmosphere without increasing its volume. Therefore, in estimating the height of the barometer, account must be taken of the amount (or weight), and elasticity (or tension) of the vapour, and *subtracted* from the height of the mercury, to give the true weight of the dry air. With a dew point temperature of 87.35° the pressure of moisture is equal to the weight of 1·26 inches of mercury, and must be *subtracted* from the height shown by the barometer, as above stated. This was the view held by Dalton, Ure, Regnault, Daniell, Sir Henry James, Alexander Buchan, &c.

In opposition to this, Professor Patton, of Bombay, maintained that moisture did *displace* an equal or equivalent volume of air, and that therefore it was only the difference of their amount which should be applied as a correction, and he estimated the amount of vapour above stated to be equal to a pressure of only 0·518 of an inch of mercury. But the first theory is thought to be the most feasible.†

(10.) Leaving the field of conjecture, we come to the actual condition of the atmosphere which covers the South Atlantic Ocean in particular, and generally the whole earth. Its elevation or weight is ascertained by the barometer, as is well known. According to the decrease in the height of the mercury on ascending to a great elevation, it is calculated that at 15 miles the air is rarified to about 25,000 times, and at 80 or 90 miles a perfect vacuum exists. It presses with a mean force of 14·73 lbs. per square inch, and forms one 1,125,000th part of the mass of the whole earth. The trade winds do not reach more than to 3 miles in height, and it is probable that all the phenomena of clouds and vapours occur beneath the height of 4 to 5 miles.

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* "Physical Geography in its relation to prevailing Winds and Currents."

† See "Abstracts of Meteorological Observations by the Royal Engineers, 1853-4," by Sir Henry James, R.E., F.R.S.; also, "The Handy Book of Meteorology," by Alexander Buchan, M.A., 1868, pp. 160—162; also the later works of Professor Tyndall.

(11.) If the surface of the earth were evenly covered with land or water, or a combination of both infinitely intermixed, the phenomena of the trade or anti-trade winds would form symmetrical zones around the globe; but the relative proportions are very different in the two hemispheres, being 100 land to 150 water in the northern, and 100 to 628 in the southern.† There is a still greater contrast, if we take the horizon of London as a great circle dividing the earth into two hemispheres. It will be then seen, that London is in the centre of that half which includes all the land, except Australia; and the other half all the water of our globe. From this cause the line of meeting between the N.E. and S.E. trades is in all seasons *northward* of the Equator in the Atlantic; and, from the land influences on the trade winds to the N.E. of Africa, there is a wide space of calms, or doldrums, whose base lies against that continent, and its apex stretching toward the coast of Brasil, as is readily seen by the illustration of the trade winds diagram, which will explain far better this peculiarity than a verbal description.

(12.) The *force* with which the wind blows is the chief consideration of the sailor, in connexion with the study of the subject. This force is readily measured in a fixed observatory, or on board a ship at anchor; but not so when she is under sail, as it is manifest that she is then apparently feeling less wind than is actually blowing, from being drifted before it. We have had some singular accounts of some of the fine clipper ships scudding at an immense rate before a gale which has been marked as of no extraordinary violence, while other ships, dull sailers, have been dismasted or disabled by the fury of the same gale, from their not being able to bear away before its great velocity. Therefore the *recorded* force of the winds met with at sea should be subject to this qualification,—what are the sailing powers of the ship which has recorded them? It is manifest that a vessel, and especially a steam-vessel, will estimate the force of the wind acting on her in exact proportion to the direction she is meeting it or running before it. Thus, a vessel of good sailing power going before the wind, which, while stationary, she would estimate as having the force of 4, and running 5 or 6 knots before it, it will appear only to have a force of a light breeze, or 3 knots; while if a steamer went 10 knots against, it would appear to blow with a force of 7, or as a fresh treble-reef topsail wind. We have no *standard* of sea-rates for the wind as yet. Perhaps it would add to the value of such observations if the sailing powers of all ships engaged in adding to our knowledge were tested when both close-hauled and running free upon a wind of known velocity.

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† The dry land, as far as it is known, is estimated to occupy 49,806,000 square statute miles. If this is increased to 51 millions for the unknown polar regions, it will allow 146 millions of square miles to be covered by the ocean."—*Sir J. Herschel.*

In former times the vague term of breeze, gale, hurricane, &c., sufficed to describe the relative character of the wind. The late Sir Francis Beaufort devised a system of simple notation which more exactly defined these forces, and which is now in universal use at sea. The figures prefixed indicate the estimated character of the wind:—

(*Beaufort Notation.*)

0 Calm.
1 Steerage Way.
2 Clean-full from 1 to 2 knots.
3 ,, 3 to 4 knots.
4 ,, 5 to 6 knots.
5 With royals ("close hauled").
6 Top gallant sails over single reefs.
7 Two reefs in topsails.
8 Three reefs in topsails.
9 Close reefed topsails and courses.
10 Close reefed main topsail and reefed foresail.
11 Storm stay sails.
12 Hurricane.
From 2 to 9 being supposed "close hauled."*

(13.) The wind over the land is found to be generally of much less force and velocity than at sea, so that the Beaufort notation was found inconvenient for land purposes; Mr. Glaisher, therefore, has proposed another notation for this use, which is now adopted at Greenwich, Liverpool, and indeed at most of the principal Observatories. It divides the force into the numbers 1 to 6, which have been proportioned to the Beaufort scale as follows:—

(*Glaisher Notation.*)

1. Moderate (Beaufort scale .... 1—2)
2. Fresh .. (———— .... 3—4)
3. Strong.. (———— .... 5—6)
4. Heavy .... (Beaufort scale 7—8)
5. Violent.... (———— 9—10)
6. Tremendous (———— 11—12)

(14.) The actual force and velocity of the wind has been calculated by Sir W. Snow Harris, by an improvement of Lind's Anemometer, by which he found air moving 20 feet in a second presses on 1 square foot with a force of about 13 oz. avoirdupois, or at 50 feet per second it would support a column of water 1 inch high, the pressure force increasing very nearly with the square of the velocity. With these data the table on the following page has been calculated:—

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* In addition to the *figures*, showing the force of the wind, the state of the weather is to be understood by *letters*, as follows:—

Letters indicating the state of the weather (*Beaufort Notation*).

b	Blue Sky.
c	Clouds (detached).
d	Drizzling Rain.
f	Foggy.
g	Gloom.
h	Hail.
l	Lightning.
m	Misty (hazy).
o	Overcast.
p	Passing showers.
q	Squally.
r	Rain.
s	Snow.
t	Thunder.
u	Ugly (threatening) appearance of Weather.
v	Visibility. Objects at a distance unusually visible.
w	Wet (Dew).

NOTE.—A bar (—) or dot (.) under any letters augments its signification:—thus $\underline{f}$ very foggy, $\underline{r}$ heavy rain, $\underset{\odot}{\underline{r}}$ heavy and continuing rain, &c., &c.

TABLE,

Showing the Force and Velocity of the Wind from light Airs to heavy Gales and Tempests.

Pressure in lbs. on Square Foot.	Velocity.		Popular Descriptions.
	Feet per Second.	Miles per Hour.	
0.002	1	0.68	Gentle airs (unappreciable by guage). (*Beaufort Scale*, 1.)
0.004	1.47	1	
0.019	3	2	Light airs (just appreciable by guage): would fill the lightest sail of a yacht (2).
0.032	3.9	2.66	
0.043	4.5	3	
0.065	5.28	3.8	Light breezes, such as would fill the lightest sails of a large ship (3).
0.071	5.87	4	
0.090	6.6	4.5	
0.100	6.98	4.75	
0.112	7.34	5	
0.130	7.89	5.38	
0.162	8.8	6	
0.228	10.4	7	
0.260	11	7.6	
0.291	11.8	8	Moderate breezes, in which ships can carry all sail (4).
0.364	13.2	9	
0.390	13.6	9.27	
0.452	14.7	10	
0.521	15.8	10.77	
0.551	16.2	11	
0.650	17.66	12	
0.780	19.3	13	Fresh breezes,—topgallant sails and royals (5).
0.830	20	13.6	
0.884	20.6	14	
0.910	20.9	14.25	
1.042	22	15	
1.170	23.6	16	
1.250	24.2	16.5	
1.302	25	17	Fresh winds; reefs (6).
1.470	26.5	18	
1.563	27.39	18.67	Strong winds; treble-reefed topsails (7).
1.630	28	19	
1.790	29.35	20	
2.084	31.15	21.47	Gales; close-reefed topsails and reefed courses (8).
2.600	35.32	24	
3.126	38.73	26.40	Strong gales; close-reefed topsails and stay sails (9).
3.647	41.83	28.52	
4.168	44.83	30.56	
4.689	47.44	32.34	
5.200	50	34	
7.800	61.18	41	Heavy gales and storms (10).
10.400	70.72	48.2	
13.000	79.07	53.91	
20.800	100	68.18	Very heavy gales; great storms; tempests (11).
26.000	111.74	76.18	
31.200	122.62	83.6	
41.600	141.30	90.34	Tornadoes; cyclones; hurricanes (12).
52.000	157.98	107.7	
62.400	173.06	120	

There is no question that the figures in this table may be open to some doubt, as the subject is a difficult one, and they are given independent of the different forces exerted by aqueous vapour and by air. Sir Henry James has also given a table, more complicated, but which does not very materially differ from the above, which will suffice for the sailor's use.

(15.) In estimating the *diminishing* pressure on the barometer during the progress of a gale, it is rather difficult to understand how the force which must, in some degree, *compress* the air, and therefore make it more dense and heavy, besides the idea that such a force may tend to heap up the atmosphere in some parts of the area, can show a *less* weight of air. There is one view which has not been made prominent—that the *horizontal* force exerted by the progress of the wind may lessen its downward vertical force or pressure in the same way that a railway train in quick motion does not deflect a bridge as the same train would do if going slower; or as a skater can pass swiftly over ice that would infallibly break with his weight when quiescent; or as the apparently anomalous loss of gravity in the gyroscope when in motion. However, these considerations have no effect on the phenomena of a falling barometer with a rising wind.

(16.) The *alternation of the sea and land breezes* in warm latitudes is an important feature in coast navigation. Its cause is generally well understood. It is owing to the different powers of radiation and absorption of heat possessed by land and water. So that, generally, when the day temperature is highest on the land, the strongest will be the alternating breezes. During the day the radiation of the sun's heat on the land causes the air to expand and rise from the surface, and then the sea air rushes in to fill the void. It frequently occurs that the surface of the soil will show a temperature of 120° under the meridian sun, and sinks to 50° or 60° during the night; while the sea, rarely having a higher temperature than 80°, and, from being a bad radiator, fluctuates but very little, it follows that it is alternately warmer and colder than the land, and hence the phenomena in question. The minimum temperature of the 24 hours being a little before sunrise, and the maximum about 2 p.m., the change of these breezes occurs generally at some little time after those hours.

(17.) The wind decidedly veers round the compass according to the sun's motion, *i.e.*, from N. through N.E., East, S.E. to S., and so on, often making a complete circuit in that direction, or more than one in succession (perhaps occupying many days in so doing), but it rarely backs, and very rarely or never makes a complete circle in the contrary direction. This has been shown by Professor Dové to be the direct consequence of the rotation of the earth; and, although the observation was recorded by Lord Bacon in 1600, it is now known as *Dové's Law of Gyration.**

(18.) Professor Coffin, from his elaborate discussions, thinks himself authorized to lay down, as a general description of the winds of the northern hemisphere,—1st. That from high northern latitudes the winds proceed in a southerly direction, but veer towards the West as they approach a limit ranging from about lat. 56° on the western continent to about lat. 68° on the eastern, where they become irregular and disappear. The area of this zone is about 11,800,000 square miles. 2nd. That farther South there is a belt of westerly winds, less than 2,000 miles in breadth, entirely encircling the earth, the westerly direction being clearly defined in the middle of the belt, but gradually disappearing as we approach the limits on either side. The area of this zone is estimated to be about 25,870,000 square miles. 3rd. That South of the zone last named the mean direction of the wind is easterly. This area is estimated to contain 60,760,000 square miles.* Professor Dové contends that there are but two Systems, the 1st and 3rd of the foregoing.†

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* When speaking of the wind veering with the sun, of course the shifting of the cyclonic winds in the northern hemisphere is not included.

(19.) In the spaces which separate these wind systems those hurricanes, tornadoes, typhoons, or cyclones occur, which are caused by the action of currents of air moving in opposite directions; their phenomena are further controlled by the influence of the land they approach or pass over. This important branch of the present subject is fully considered hereafter, but the occurrence of storms is an exceptional case in the vast system of atmospheric circulation we have been considering.

(20.) The foregoing will suffice to show the general nature of winds and their causes, and the reasons of those modifications and derangements, which are sometimes difficult to explain in detail.

In (11) it is shown that the division between the northern and southern winds systems is always to the North of the Equator, and therefore the meteorology of the South Atlantic is more simple than that of the northern part. But, as will be seen hereafter, the great influence that land has over the direction and character of the wind currents, forms on the African and Brasilian coasts, a varying condition, analogous to the well known monsoons of the eastern seas.

(21.) The wind zones of the South Atlantic may be summarily described as follows, and they will be subsequently dilated on in the same order.

1. The *South-East Trade-Wind*, blowing from S.E. to N.W. in the open ocean, between lat. 30° to 25° S., and lat. 2° S. to 5° N., according to the season. The zone of calms, or "doldrums," separating it from the N.E. trade-wind will also be noticed.
2. The variable winds or monsoons on the Coast of Brasil.
3. The variable winds or monsoons on the African coast.
4. The variable winds and calms near the Tropic of Capricorn.
5. The *Anti-Trade*, or *Passage Winds*, separated by the foregoing from the S.E. trades, and blowing, variably, from western quarters.

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* "Winds of the Northern Hemisphere," by Professor Coffin, A.M., Pennsylvania, U.S., in "Smithsonian Contributions to Knowledge," vol. vi., 1854.

† See Report, Brit. Asso., 1845. See also Professor Mitchell, in the American Journal of Science and Arts, vol. xix. p. 254. A great amount of information will be found on the general subject in the works of Kämtz and Romme, who have also laboriously studied and generalized the phenomena of the winds, and to whose labours much that is here said is owing. But by far the largest collection of observations, arranged in order, is contained in Capt. Maury's "Pilot Charts," before alluded to, which are well known to all sailors.

THE SOUTH-EAST TRADE WIND.

(22.) The area occupied by the S.E. trade-wind is of larger extent than that over which the N.E. trade blows, for the reason that the intervening calms occupy a space North of the Equator, while the polar limits are found on about the same parallel in each case. But from this space must be deducted that portion on the eastern side which lies eastward of a line joining the Cape of Good Hope and Cape Verde, where the winds blow toward the land from the southward throughout the year, a deflection of the trade-wind, which thus assumes the character of a monsoon. On the western side also the American continent so far deflects it from its normal course, that it blows to the northward of East. In the S.W. portion besides that eastward of Rio Janeiro, the trade is very variable and uncertain.

(23.) In the central part of the area of the S.E. trade the wind is remarkably steady, and of great force, so that for homeward bound ships passing the Cape of Good Hope there is a long stretch of favourable wind that can always be reckoned on as far as the Equator. This will be well exemplified by the illustrative chart, which will explain the relation of this true trade wind with those deflections previously alluded to on either side of it.

(24.) The relative strength of the N.E. and S.E. trades has been the subject of some controversy. Captain Maury contends that from the difference of 0·055 inch in the mean barometric pressure, as observed by the Dutch between the parallels of 5° and 20° in the N.E. and S.E. trades, being 29·968 for the former, and 30·023 for the latter, that the S.E. trades are proportionately stronger, and finds that the homeward bound vessels (2,235 in number), with the wind abeam, have an average rate of 5·6 knots an hour, while in the S.E. trades, with the wind generally dead aft, their rate is 6 knots. He contends that if the wind were abeam instead of dead aft, that this rate of sailing would be increased 2 or 2½ knots, which would make the difference still more manifest.

(25.) This branch of the subject, the relative velocity of the two trade winds, has been more largely discussed by Lieutenant Brito de Capello, of the Portuguese navy, and we therefore give the entire essay as follows, which will clearly express the data and conclusions arrived at.

(26.) Lieutenant Brito de Capello says:—In the following remarks the strength of the wind is inferred from the rate of sailing per hour of all the ships during the two epochs, when the N.E. and S.E. trade winds attain their extreme range; that is in the months of February and March, and August and September. They are illustrated by the diagrams adjoining.

(27.) It is true that, generally speaking, the rate obtained at the two periods selected may not be critically accurate in respect of the strength of the wind if we take two consecutive days. This rate will depend on the variableness of the wind and the different boards the ships are obliged to make. Nevertheless, in the central districts of the trades, where the direction of the wind is nearly constant and simultaneously favourable to the route, the rate obtained at the two periods will be a sufficient measure of the strength of the wind, setting aside the effect of the currents, &c. In the zones of calms and light airs, for instance, the distance sailed by the ship is much less than that gone over in the course of twenty-four hours. Nevertheless, we may here also obtain the strength of the wind from hourly progress shown by the journals themselves without the result obtained from two epochs.

(28.) In all cases the direction of the wind as respects the course must be considered. It becomes necessary to reduce all these to one single condition: for instance, to the most favourable point of sailing for all ships, that is with the wind free, say from nine to ten points. These corrections I have effected by means of co-efficients, thus approximating to a correct rate. The value of these co-efficients is calculated on the hypothesis that the rate of a ship is very nearly 0·7 of the rate she would attain under the same condition of wind when going free; that the rate with the wind aft, and also when within a point of it, is 0·8 of that when going free; that with the wind at twelve or fourteen points it is 0·9 of that going free.

Such a proceeding is undoubtedly empirical; but the mean results appear to be a very close approximation to the truth, considering the nature of the inquiry. Again as the various regions in the Atlantic at the two periods are represented by the deduced rate of similar routes from the same corrections, and from the same nations, the relative results are not sensibly altered, and are in fact the relative numbers belonging to the two different epochs which are under consideration. We have for these two epochs 1,548 tracks—796 Dutch, 662 American, and 90 Portuguese.

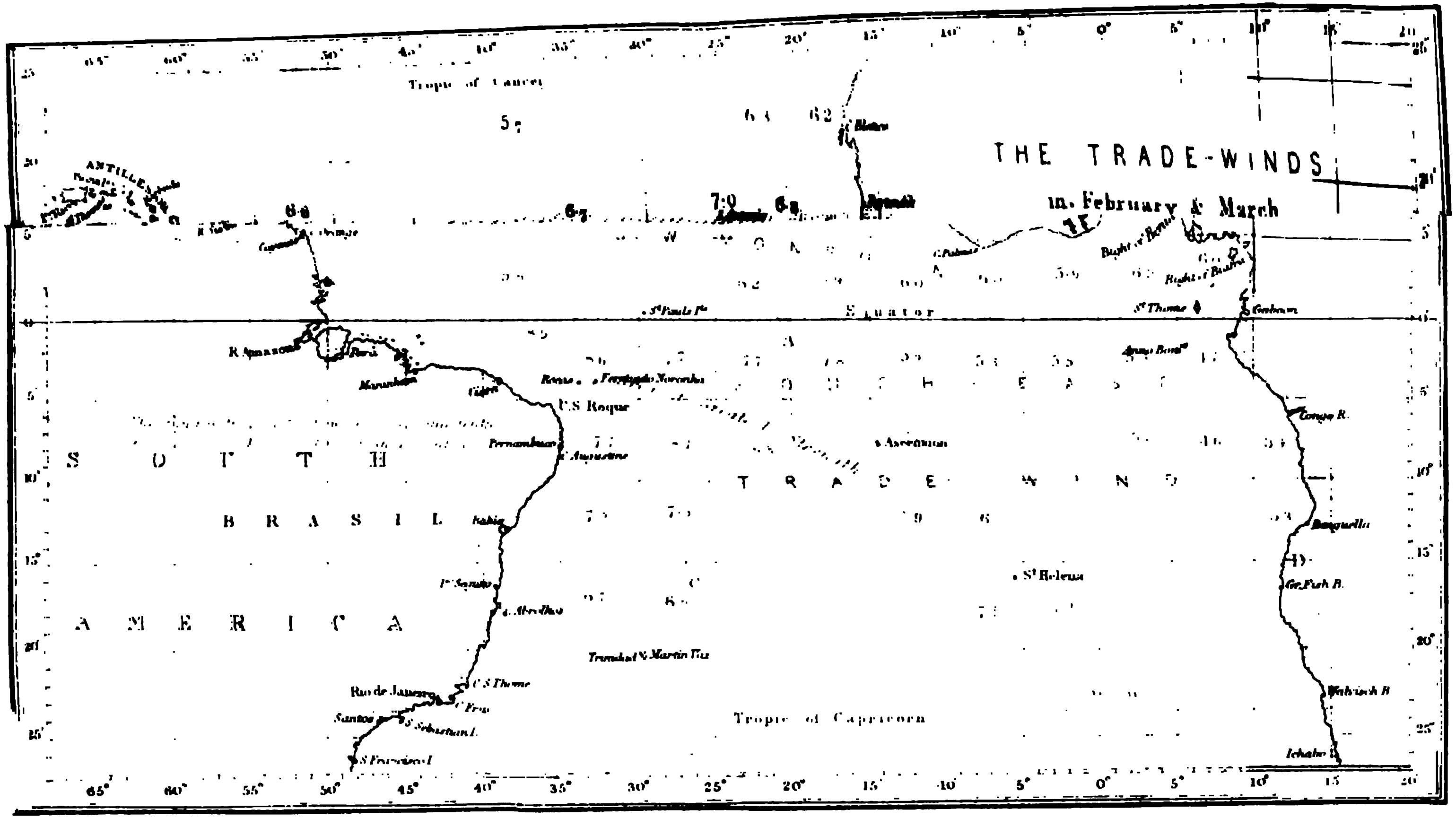
(29.) In order to find the mean hourly rate of sailing for each zone of 5° of latitude throughout the different longitudes, we have added together the numbers which represent the tracks every day in the same zone of American and Dutch ships following similar routes. Having taken their mean, and found the hourly rate of sailing, we have applied to this last the co-efficients to reduce them to the rate with the wind free. Where the American and Dutch routes differ in the courses sailed by each, their co-efficients differ also, and these have been first applied to obtain the figures for each zone, and the average calculated afterwards.

(30.) *The N.E. Trade.*—For the N.E. trade at the two epochs under consideration we have 803 routes, viz.: 424 Dutch and 379 American.

The region of the N.E. trade is divided into four portions. 1. The eastern and most frequented by ships going South and passing to the East of the Cape Verdes. 2. The mean route of ships going South, passing West of those islands. 3. The central part of routes to the southward for ships from Europe and America. 4. The part containing the westernmost American home return routes.

(31.) *February and March.*—For the first of the above portions we have twenty tracks—fifteen Dutch and five Americans. We apply to the hourly rates the co-efficient 0·9 (as divisor) to correct them for the wind free, this being generally twelve to fourteen points. The mean rate thus found from the parallel of 30° N. to 5° N. is 6·1 miles.

For the second portion we have seventy-one tracks—fifty-four Dutch and seventeen Americans. The co-efficient 0·9 is used as far as the parallel of 15° N. for the same reason. The mean rate between the same parallels of 5° and 30° N. is 6·3 miles.


THE TRADE-WINDS
in February & March
Tropic of Cancer
Equator
Tropic of Capricorn
ANTILLES
SOUTH
BRASIL
AMERICA
SOUTH EAST
TRADE WIND
R. Amazons
Para
Maranham
C. Roque
Pernambuco
St Augustine
Bahia
Abrolhos
Rio de Janeiro
C. S. Thome
C. Frio
Santos
S. Sebastian I.
S. Francisco I.
Rocas
Fernando Noronha
St Pauls Rs
Ascension
St Helena
Trinidad & Martin Vaz
C. Blanco
C. Verde
C. Palmas
Bight of Benin
Bight of Biafra
St Thome
Gaboon
Anno Bom
Congo R.
Benguella
Gt. Fish B.
Walvisch B.
Ichaboe I.
65°
60°
55°
50°
45°
40°
35°
30°
25°
20°
15°
10°
5°
0°
5°
10°
15°
20°
25°
20°
15°
10°
5°
0
5°
10°
15°
20°
25°
5 7
6 3
6 2
6 3
6 8
7 0
6 8
6 8

From the combination of 165 tracks of Dutch ships and 97 Americans, we obtain the mean result of the central portion. Here we have used the divisor 0·8 for all the Dutch tracks, the navigation being generally with the wind at seven points nearly. The American numbers are not altered. The mean rate between the parallels of 5° N. and 25° N. is 6·5 miles.

Finally, in the westernmost portion the strength of the wind is deduced from forty-four tracks of American ships, with the wind free, from 32° to 33° West of Greenwich from the Equator to 25° N. Here there are no corrections, and the mean rate is 6·7 miles.

The mean rate in the whole region of the trades during the months of February and March is 6·4 miles free.

(32.) *August and September.*—During the months of August and September the N.E. trade is weakest, and is in its most northern position of the whole year. Notwithstanding this, the mean strength of it on the African side appears to be greater than at the epoch of February and March.

For the two months we extend our enquiry only as far as the parallel of 15° N. on the eastern side, and as far as the parallel of 10° N. on the western side. To the South of these parallels is the zone of calms and the S.W. monsoon.

This region is again divided into the same four portions, the only difference consisting in the central portions, which are re-divided, the average rate of Dutch ships and American being more apart than in the months of February and March.

In the first portion (East of the Cape Verde Isles) the average wind blows a little stronger than at the epoch already mentioned. The strength of the winds is deduced from fourteen tracks of the Dutch and four Americans. The average rate between the parallels of 15° and 35° N. is 6·3—0·2 mile superior to the corresponding one of February and March. The divisor 0·9 has been applied, the direction of the wind being nearly the same as at the other epoch.

In the tracks West of the Cape Verde Islands the average track of 130 Dutch and 25 American ships is over 6·5 miles; the divisor is again the same 0·9, and the rate is 0·2 in excess of the same in February and March.

In the central and western portion a great difference in the intensity of the wind is observed in comparison with that of February and March. Sixty-nine Dutch ships homeward give the mean of 5·6 miles in the three sections where the N.E. trade prevails, having the divisor 0·8 applied, the co-efficient of the wind at seven points.

Some degrees further to the West, 129 American ships going southward give the mean of 5·1 miles, with the co-efficient of 0·8 in the first section, 0·9 in the second; the third section is not altered, the wind being free.

The tracks of thirty-five American ships from the southward for their own ports leave no doubt of the relative weakness of the wind in parts more and more to the westward. In these parts the farther West the wind is the more free. The mean rate between the parallels of 10° and 30° N. is about 4·8 miles.

The mean rate, running free, in the whole region of the N.E. trade during

August and September is then 5·7 miles, 0·7 less than in February and March.

Very great differences may be observed during the two epochs in the central and western regions. While in February and March the rates in the central and western portions exceed respectively by 0·1 and 0·3 mile the general mean rate, in the months of August and September we find the contrary—the two central and western ones are less than the mean general rate by 0·4 and 0·9 respectively.

This last result is well worthy of observation, because it is contrary to the general belief that the wind gains in strength more and more throughout the year in proportion as the distance from the African coast is increased.

(33.) *The S.E. Trade.*—The strength of the S.E. trade, properly called, is represented at the two epochs from 655 ships—417 Dutch and 238 American. For the region of the S.W. monsoon in the Gulf of Guinea and the sea along the African coast to the parallel of 15° S. we have the average rate of 90 Portuguese ships. In these last tracks, the wind being generally foul, and under the influence of the current, the hourly rates are deducted direct from the journals.

We have divided the whole extent of ocean from the zone of calms as far as the southern limit of the S.E. trade into three regions :—

1. The northernmost and easternmost, or simply the easternmost, where the S.W. monsoon almost entirely prevails, and the S.W. wind of the gulf and near the coasts, is limited by the African shore and the line B A D (see plates). Herein the strength of the wind, as above mentioned, is obtained from Portuguese ships.

2. The region we call western is comprised between the coast of Brasil and the lines B A C. The strength of the wind here is obtained from Dutch and American ships going southward.

3. The remaining region which may be called central and southward, or simply central, is bounded by the southern limit of the trade, and the lines C A D. Here the strength of the wind is obtained from Dutch and American ships coming from the East Indies.

The limits of these three regions expand and contract according to the seasons.

(34.) *August and September.*—In this space the S.E. trade extends to the parallels of 10° to 15° N., and changing its first direction, and converting itself even into a S.W. monsoon to the northward of the Equator, from 30° to 35° W. of Greenwich near the African coast.

(35.) Commencing with the eastern part, we have here the mean hourly rate of progress of fifty-one Portuguese ships, to which we have applied the above co-efficients to bring them to our condition. The results are shown by the figures in each of the five compartments along the coast. It is in the course of these two months that the S.W. winds of the gulf are the strongest of the whole year.

It must nevertheless be observed that the ships from which we have obtained our results were not generally good sailers, being old; but as some compensation for this, the rates obtained were more correct, being collated from journals on board and from day to day.

The strength of the wind in the central region is represented in these two months by 124 tracks with the wind aft—eighty-five Dutch and thirty-nine American.

(36.) The mean track of the two groups is from 3° or 5° E. of Greenwich, in 25° South, to the Equator, in 33° or 21° W. of Greenwich. The tracks spread more and more in proportion as they approach the Equator. The mean rate of the Dutch between 25° S. and the Equator is 5·7 miles with the wind aft, or 7·1 free. In the westernmost part the American ships appear to have the wind strongest, although the difference in the figures may be attributed to the superiority in the sailing of these ships, or perhaps to some difference in their having the wind in some sections, the wind drawing more to starboard. These tracks continue only to 5° S. The other sections belong to the western division. The mean rate of sailing of the American ships is nearly 6·2 miles—perhaps 7·7 free.

(37.) In the western region South of the Equator we have for the two months 232 ships—146 Dutch and 86 American. These are divided into two groups, following the example of Messrs. Maury and Andrew. The eastern one is formed of 162 ships—123 Dutch and 39 Americans. The mean track of these crosses the Equator between 21° and 22° W., and in 20° S. is in 29° W. The western group includes 70 ships—41 American and 29 Dutch; the mean track of which crosses the Equator between 27° and 28° W., and the parallel of 20° S. in 33° W. The routes of both are nearly the same, and have the correction of seven points. The mean rate of the eastern is 6·0 miles, or 7·5 corrected; and that of the seventy ships to the westward 5·9 miles or 7·4 miles corrected. The difference of 0·1 mile which the western one shows, arises perhaps from some of their boards made to double Cape St. Roque and Cape St. Augustine. It is properly in the second section, opposite the most salient part of the coast of Brasil, that the rate of the western ships is less than that of the eastern.

(38.) To the northward of the Equator we have only two average northerly routes as far as the parallel of 5° N. The westernmost is deduced from thirty-nine ships (American); the average rate in this solitary section is 6·0 miles, or 7·5 corrected. The eastern one comprises eighty-five Dutch tracks, giving a mean of 5·0 miles, or 6·2 miles corrected. In the second, in consequence of the uncertainty of the lay, the resulting mean is rejected.

The mean corrected hourly rate of the whole western region, reckoning the American tracks to the northward, is 7·3 miles.

(39.) *February and March.*—The divisions are the same as for the former epoch. The three regions determined are in the same relative positions, excepting that they are a little moved to the southward.

The western and central regions both reach the Equator, and the eastern one as far as the parallel of 5° N. on the meridian of 12° W. The southern limits are 5° further South than those of August and September.

The hourly rates are found from similar tracks and from ships of the same nations, and consequently the figures undergo the same modifications; that is to say, the same co-efficients are applied in similar sections, and hence results are obtained perfectly fit for comparison between the same epochs.

The strength of the wind in the eastern region is represented by the mean hourly rate of thirty-nine Portuguese ships. The strength of the wind in the gulf is considerably lessened, whilst that about the coast to the South of the Equator is, on the contrary, augmented.

The mean strength of it in the whole eastern region corresponds to the average rate, corrected, of 4·9 miles.

(40.) In the central region we have the same Dutch and American tracks. The average rate of 110 Dutch ships from 30° S. to the Equator is 5·4 miles, or 6·8 corrected. The difference between the rates of these two sets in these two months is 0·7 mile, 0·1 mile more than that of August and September.

In the western region there are the same number of Dutch and American tracks.

The easternmost, composed of fifty-six Dutch ships and fifteen American, gives the average rate of 5·7 miles, or 7·1 scarcely, corrected, from the Equator to 20° S.

The tracks further West of fifty-one American and twenty Dutch ships give the average rate of 5·8 or 7·2 miles corrected. It may also be observed, that the western rates are inferior to the eastern only off Capes St. Roque and St. Augustine. This anomaly may be accounted for in the same manner as for the former epoch

(41.) The strength of the wind for the whole western region is represented by the corrected average of 7·0 miles, taking into account the value of 6·0 miles rate of the first section of the American tracks to the northward.

(42.) The difference in the strength of the wind in the whole region of the S.W. monsoon in the S.E. trades for the two epochs, is scarcely 0·1 mile in the average corrected rates.

By not taking the S.W. monsoon into the calculation, we can compare the strength of the S.E. trade, properly so called, for the two epochs in consideration. In the months of August and September, the average rate of the S.E. trade proper is equal to 7·1 miles, corrected; while in the months of February and March it is 6·9 miles, less by 0·2 mile.

The slight difference in the strength of the S.E. trade, although the region in which it prevails is subject to great changes from one epoch to the other, appears to be well marked.

Whatever may be the amount of confidence in the co-efficients employed in this investigation, as they enter into the identical tracks of the ships of the same nation, it is certain that the relative value of the corrected rates obtained cannot be materially altered, and consequently the same may be said of the relative force of the wind.

The N.E. trade undergoes in the two epochs considerable change of strength. The difference between the strength of it at the two epochs amounts to 0·7 mile in the wind corresponding to 5·7 corrected rate.

With respect to the two trades, the greatest difference between their intensities is observed at the epochs of August and September—that is, when the S.E. trade appears to attain its greatest strength, and the N.E. has its least.

Again, as to the S.E. trade proper, this difference amounts in August and September to 1·4 miles; that is to say, the strength of the S.E. trade surpasses that of the N.E. by an amount capable of adding 1·4 miles to the corrected rate of 5·7 miles.

If, at this same epoch, we compare the N.E. trade with the S.E. trade along with the S.W. monsoon, the difference is only 0·7 mile.

During the months of February and March there is an excess in the N.E. trade over its antagonist, the S.E. with its S.W. monsoon of the gulf; but there results, on the contrary, an excess of 0·5 mile in the rate of the N.E. trade when comparing it only with the S.E. proper.

(43.) The charts show the mean direction of the winds and their deviations, according to the Dutch, of the Meteorological Institute of Utrecht, Maury's wind charts, Admiral Chabanne's and the tracks of the Portuguese ships in the Gulf of Guinea, and they show those regions where the wind, on an average, blows harder, or with an intensity beyond a certain number of miles an hour, corrected.

The limits of these different districts are found by constructing the curves of progress for each set of routes; on these are shown sections of rates determined (6·5, 7·0, 7·5 miles). These sections transferred to their places give the parabolic and other figures shown in the charts.

The portion of the N.E. trade where the wind is over 6·5 miles, corrected, assumes a figure, formed in the months of August and September, showing the greatest intensity is between the meridians of 20° and 25° W.

(44.) The central lines bear figures indicating the zones where the wind blows the strongest in the whole extent of the regions under consideration. The lines inclining to the Equator include several degrees, and even change their direction from one epoch to the other. The extent of these lines is greater in the N.E. than the S.E. trade.

Comparative Table of the Strength of the S.E. Trade and S.W. Monsoon in the Months of August and September, and February and March.

REGIONS, Etc.		August and September.	February and March.
		Corrected Rates.	
Eastern and Northern Regions.	S.W. Monsoon, North of the Equator	6·4	..
	S.W. Monsoon of Gulf of Guinea	6·0	4·7
	S.W. Monsoon of Coasts of Angola, Congo, &c.	4·5	4·8
	Entire region of B A D	5·3	4·9
Central and Southern Regions.	Dutch Ships' tracks	7·1	6·8
	American Ships' tracks	7·7	7·5
	Entire Central Region	7·4	7·1
Western Region.	Eastern side	7·3	7·1
	Western side	7·6	7·0
	Entire Western Region	7·5	7·0
General Averages		6·4	6·3

(45.) *Extent.*—The limits of the S.E. trade wind are very difficult to define verbally. The illustrative diagrams will be far more efficient in giving an idea of its varying extent and borders. On the North it is separated from the N.E. trade wind by the belt of equatorial calms or doldrums and side monsoons, which are more fully described in our North Atlantic Memoir; but a few words will be given hereafter on this part in connexion with the changing winds on the African coast.

(46.) Further to the westward, the northern limit of the S.E. trade is found further to the northward than is marked in the foregoing, the line of separation running across the ocean in a diagonal direction, generally from W. by N. to E. by S.; but it would also appear that the calms do not pass South of the Equator, but this is scarcely the case, for at times the S.E. trade fails in lat. 6° S. off the Brasilian coast in the months of February, March, and April, when the full effect of the vertical sun is limited to the southern hemisphere. During the rest of the year it is seldom or never lost South of the Equator.

(47.) The southern limits are also very indefinite, and much more so on the western than on the eastern side of the ocean. "The calms of Capricorn," as they have been termed, are also very vague in their extent and limits, but they are much narrower on the East than on the western side. Here again the diagrams will be more expressive than a verbal description. But it may be observed, that while the belt of calms or varying winds is, or may be, only 4 or 5 degrees of latitude in breadth on the eastern meridians, it is seldom less than two or three times that breadth on the American side. The lines given on the chart are chiefly derived from Capt. Maury's observations, but these are so far imperfect that it is very difficult to define a mean where the data is so vague. The wavy boundaries thus shown are rather the effects of this uncertainty of where the trade wind absolutely fails and the calms or variations sets in.

TABLE, *showing the Equinoctial Limits of the N.E. and S.E. Trade Winds, between the Meridians of* 18 *and* 26 *degrees West.*

N.E. TRADE WIND.			S.E. TRADE WIND.		INTERVAL BETWEEN.
CEASES.	General Extremes.	Probable Mean.	General Extremes.	Probable Mean.	Mean Breadth.
In January at	3° to 10° N.	5° N.	0½° to 4° N.	2¾° N.	2¼ degrees.
February......	2 to 10 —	4 —	0½ to 3 —	1¼ —	3¼ "
March	2 to 8 —	4¾ —	0½ to 2½ —	1¼ —	3½ "
April	2½ to 9 —	5 —	0 to 2½ —	1¼ —	3¾ "
May	4 to 10 —	6½ —	0 to 4 —	3½ —	4 "
June	6½ to 13 —	8½ —	0 to 5 —	3 —	5½ "
July	8½ to 14 —	11 —	1 to 6 —	3½ —	7½ "
August	11 to 15 —	13 —	1 to 5 —	3¼ —	9¾ "
September	9 to 14 —	11½ —	1 to 5 —	3 —	8½ "
October	7½ to 14 —	10 —	1 to 5 —	3 —	7 "
November	6 to 11 —	8 —	1 to 5 —	3 —	4½ "
December	3 to 7 —	5½ —	1 to 4½ —	3¼ —	2¼ "

(48.) The foregoing table, derived from Captain Horsburgh, has been usually given to define the extent of the calms between the trade winds, but it must be remembered that this is only applicable to the limited area over which ships sailed across the Equator in former years. Now that a much wider range in longitude is taken, and a much more westerly route is frequently taken in sailing southward, it becomes necessary to extend the information which was sufficient in former years. For this see the charts.

(49.) In a previous part (6) to (8), pp. 33—34, it is said that the trade winds meeting near the Equator become either neutralized, rise up and cross each other, or that they rise on their own side, and revert towards the pole of their own denomination; and that this upper aerial current, reaching the tropic of Capricorn, descends and forms the source of the anti-trade winds to the South of it.

(50.) Captain Henry Toynbee, to whom meteorology is much indebted, has paid much attention to this subject in some recent voyages, and in a communication to the Royal Society (June, 1865), he gave the result of his barometric observations, which are here quoted from. The original is illustrated by some interesting diagrams, which are not repeated here.

(51.) Having lately made five voyages to India, leaving England on the 1st of July, and returning early in April, I have observed the recurrence of certain facts relating to the weight and circulation of the air in the same part of the world at the same seasons of the year, from personal registration of the barometer, wet and dry bulb thermometers, direction and force of the wind, &c., five times daily.

These five voyages have carried us through the Atlantic Oceans from 50° N. to 40° S. lat. in the months of July and August; again returning home, we have passed from 34° S. lat. to 50° N. lat. during the months of February and March each year.

(52.) We are told that the Great Sahara Desert being heated by the sun of the northern summer causes an upward current of air, which draws in the air from the sea to restore equilibrium, just as the heated lands in India during the same season cause a S.W. monsoon in the Bay of Bengal, where a N.E. trade would otherwise prevail. Our barometer diagrams show this by being lower near Africa, and gradually rising as the distance from the demand is decreased. Again, in about 13° N. lat., where the S.W. monsoon commences, it is always much more from the West than it is further southward, where the wind draws to the South, and very generally turns into the S.E. trades without any intervening calm. In fact, this heated part of Africa seems at this season to have the power of bringing the N.E. trades to an end in about 17° N. lat. between the islands and the main, instead of 13° N. lat. outside, and of causing an indraught from the westward; it also gradually turns the S.E. trade which blows near Africa into a S.W. wind, which we may suppose finds its way into the upper stratum of air over this heated land. Part of this S.W. monsoon seems to be formed of the damp cloudy air which exists in the doldrums, whilst the rest is evidently formed of clearer air—another evidence that it is part of the S.E. trades.

(53.) Having thus considered the curves of the outward passage from England with respect to their difference when further East or further West, we will view them in a North and South direction. It will be noticed that the lowest barometer occurs in the belt of doldrums, between the trades; and by comparing the outward with the homeward route it will be seen, as is well known, that this belt is further North in July than in March. It is interesting, however, to see that the lowest barometer travels North or South with the belt of doldrums, showing that its cause must be sought for there, and not in centrifugal force, which might be supposed to fix it at the Equator.

(54.) The sailor is naturally led to ask how it is that the barometer is lower here, a zone towards which two trade winds are pouring in an immense body of air along the earth's surface, and in nearly opposite directions; for near the Equator the trades draw more North and South. We suppose there can be but one answer, viz., that here the air rises, and forms those two upper currents which rush towards the Poles, above and counter to the trade winds. Maury tells us that the so-called African dust is really South American, and that much more falls in the northern than in the southern hemisphere, from which he argues that the air which formed the S.E. trades, having traversed more sea and picked up more moisture, rises in these doldrums, and travels to the N.E. above the N.E. trades; and *vice versa*, that the N.E. trades travel to the S.E. above the S.E. trades. He does not say how they pass each other, neither can we, but we have strong evidence of a current of air travelling above and in opposite direction to the trade winds, because we generally see the high clouds travelling in that direction. We have, however, as it were, even seen the air ascending; for on the 15th of March, 1865, in 4° 18′ N. lat., and 20° 33′ W. long., when we had light fleecy clouds passing over us from the N.E., and we lay becalmed and roasting, longing for the trades, my chief officer came and reported to me, with a hopeful countenance, that he had seen these light fleecy clouds travelling from the N.E. None but those who have experienced these calms can imagine how anxiously wind is looked for: to the N.E. of us there was an arch of clouds in the sky extending from the S.E. to the N.W. points of the horizon, with a calm and low barometer on the South side of it where we were, and (as we found afterwards) the N.E. trade and a higher barometer on its North side; therefore the arch of clouds was probably formed by the condensation of moisture as the air rose, while we lay becalmed at the foot of the inclined plane of still air, up which the N.E. trade was just commencing its ascent.

(55.) Travelling South across the Equator, it will be noticed how uniformly the barometer rises until we arrive at the southern limit of the S.E. trades; but on referring to the homeward curves in February, it will be noticed how much lower the barometer ranged then than in August. The homeward route through the Atlantic differing much from the outward, does this difference of barometer arise from difference of seasons or difference of longitude? By comparing the routes near the Equator, where they come very close to each other, and where difference of height in the quicksilver is as great as any other part, I am led to think that it depends upon the different seasons.

(56.) Whilst speaking of the homeward route, it is interesting to remark, how on leaving the Cape of Good Hope we invariably had a valley, as it were, in the atmosphere, which quickly rose as we sailed to the N.W., even though we may have started in a south-easter, which is the high-barometer wind in these latitudes. I had noticed that after rounding Cape Agulhas with a south-easter and high barometer, the column fell suddenly after rounding the Cape of Good Hope, though the S.E. wind continued; and I suppose that the fall is caused by the air ascending as it comes in contact with the high land: the curves seem to support this opinion.

(57.) At both seasons of the year there is a heading up of the air at the polar end of each trade, in the place where Maury tells us that two upper currents come to the surface of the earth (6); the one we have already alluded to, which comes from the Equator towards the Pole, moving above the trades, clouds proving its existence; the other, Maury tells us, rises at the Pole, and travels as an upper current, above the strong westerly winds which prevail in high latitudes, towards the Equator; it can hardly be expected to have many clouds, he says, as its moisture must have been condensed by cold before rising at the Pole, so that it becomes cold and dry.

We may ask what evidence the sailor can give for theory as deduced from observation.

(58.) First, then, from these heaps of air he finds two surface winds blowing in opposite directions; the one moving towards the Equator is cool, dry, and heavy, the other moving towards the Pole is warm, damp, and light. He may well say, if two surface winds blow in opposite directions from this heap of air, there must be air brought to it by an upper current or currents to keep up the heaping; but he may naturally ask, how do I know that an upper current comes from the Pole? First, because the prevailing surface winds in high latitudes blow towards the Pole, which air must return; and, secondly, because the trade winds are composed of cool dry air, which could not have come from the Equator. Here there is pretty good evidence that two upper currents come to the surface of the earth in these zones where the air is heaped up, and again, that in dipping to the surface by some unknown means they cross each other, as Maury conjectured.

(59.) Perhaps a few words may be desirable as to the manner in which the westerly winds which blow in high latitudes appear to draw the air from the heaps above mentioned. Here we will refer to our experience in 40° S. lat., where the normal circulation of the air is less interfered with by the land.

This parallel of latitude is subject to a series of gales which commence at North and end at N.E. or W. As the North wind sets in, the barometer falls, the air becomes warm, damp, and cloudy; the wind gradually draws round to the N.W., after a time rain accompanies the wind, the barometer continues to fall, often fast, until in a heavy shower of rain the wind shifts to the West, when the barometer immediately rises, generally followed by a strong breeze from the westward, which decreases as the quicksilver rises, very often settling down into a calm. After a few hours the North wind sets in again, with a falling barometer, and a repetition of the whole series takes place.

(60.) One is naturally led to ask why the trade wind draws air from this heap in a regular continuous stream, when these gales are fitful. May it not be because in the direction in which the trade wind moves the meridians diverge and give plenty of room for the flow, whereas the westerly winds have converging meridians which seem to check the progress of the air. These fitful gales have always led me to think that the air was checked in its course.

If further South, say in 50° S. lat., the wind continues steady from the West (as Maury leads us to suppose is the case), then this zone of 40° seems to act as a reservoir for the westerly winds, being constantly refilled and steadily drawn off, only the stream into the reservoir is freer than that which runs out.

(61.) Now, if we consider that these gales are composed of the warm damp air which comes to this heap from the Equator above the S.E. trades, descending to the surface of the earth and travelling towards the Pole, their westing is accounted for by the change in the diameter of the circular route which the air has to describe in accompanying the earth in its revolution. These gales changing from N. to N.W. and W. have been treated as the N.E. quarters of southern hemisphere cyclones; and we read in the "Nautical Magazine" of a ship having hove to, to allow one of them to pass; but if, as we suppose, they form part of the normal circulation of the air, it seems useless to heave to, to avoid them. The source of these gales being to the North of them is a sufficient reason why the wind does not change to South of West. The Polar wind gales which are experienced in these high latitudes, seem to derive their air from that upper current returning from the Pole, part of which sometimes makes its way downward to the surface in high latitudes, especially in spring.

(62.) The gales of the southern hemisphere, just remarked upon, have their exact counterpart in the high latitudes of the northern hemisphere, though I have not noticed them to be so constant, perhaps on account of there being much more land in the northern hemisphere. Still all seamen know how, after getting North of the N.E. trades, we look for the wind to come from S., S.W., and W., with warm air and rain.

(63.) These curves, and the arguments deduced from them, seem to favour Maury's theory of the circulation of the air; where he supposes two rising currents we have a low barometer, and where he supposes two descending currents we find a high barometer; but they are also suggestive, and a series made with standard instruments for each month in the year might lead to most useful discoveries as to the normal circulation, and its disturbance by the effect of land. How strikingly these curves prove the uniform state of the atmosphere in those parts of the Atlantic between the trades, at the same seasons of the year! especially in contrast with their sudden distortions on the Polar side of the trades, where their irregularities resemble the waves of the sea in the same latitudes, which may in fact be called the resultants of these distortions.

(64.) **Direction.**—The principal source from which we can derive a correct knowledge of the direction and frequency of the winds of the South Atlantic, is the great mass of material accumulated and arranged in the Pilot Charts of Captain Maury. But these will not suffice for more than a general conclusion, as they are not sufficiently definite to give an exact knowledge. But this is of minor importance to the sailor; they will explain almost all that he requires to know. From the fact that in them the direction of the wind is only noticed for 16 points of the compass, omitting the "by" points, undue importance is given to these principal quarters from which the wind blows. It is therefore futile to attempt to draw more exact conclusions. The force also, of the wind, an important element, is wanting in these observations, and can only be arrived at by the proportion of calms encountered.

(65.) In mid-ocean, or between the meridians of Greenwich, 0°, and 30° (or 35°) W., and between the Equator and 30° S., the portion of the ocean most free from land influences, it will be seen that the S.E. trade wind blows with great regularity, as before noticed. But there is this feature which is much exaggerated on either side of the meridians named—that on the eastern or African side, the wind blows much more from the southward, and on the Brasilian side much more from the eastward than the normal direction of the trade wind, and at its outer limits this S.E. trade wind is so drawn from its course that it blows at a right angle to its ordinary direction, becoming a S.S.W. and S.W. wind against the African coast, and a N.E. wind on that of Brasil. In mid-ocean also there are much fewer calms and light airs than where the wind is so much interfered with by the heated continents on either side.

(66.) A steady trade may therefore be reckoned on with much certainty in crossing its area, and it is only when the land on either side is approached, as it must be in crossing the Equator, that the difficulties of contending with varying and adverse breezes have to be met. In the ensuing paragraphs some notices of these peculiarities are given.

2. Winds on the Coast of Brasil.

(67.) On the eastern coast of Brasil, between the months of September and March, the winds generally prevail from N. by E. to N.E. by E.; between March and September the prevailing winds are from E. by N. to E.S.E.

The former of these are generally termed the NORTHERLY MONSOON, and the latter the *southerly* one; although there appears, in fact, to be no direct and opposite change in them on or about the equinoxes, as is generally the case with the winds so called. These winds are simply a continuation of the S.E. trade, *which changes its direction* as above described, and is influenced by the land on its approach thereto.

The influence of the land, or rather of its *temperature*, is more or less according to the action of the sun at the particular seasons of the year. When the sun is to the northward, no particular difference is observed in the S.E. trade, but it may be carried within sight of the coast, with scarcely any deviation; nevertheless, about both equinoxes, but more especially when the sun is advancing to the northward, calms and very light winds, with apparently no settled quarter, will prevail near the coast; and this may be said to be more particularly the case on that part of it between the Abrolhos and Cape Frio. As the sun advances to the southward, the trade wind will gradually come round to the north-eastward, and will have its retrograde movement with the return of the sun to the equinox. At this latter season ships, on approaching the coast, will begin to observe this northerly inclination of the S.E. trade within 4° or 5° of it, and which they will find gradually to increase as they incline to the westward.

Within a few miles of the coast, and in the different roadsteads and harbours, the wind generally blows directly upon it; and in the deep harbours, and upon the shore, this is generally superseded by a land breeze, which sometimes lasts the greater part of the night. About Rio de Janeiro this land breeze sometimes extends as far to seaward as Round Island, while at Pernambuco it rarely reaches the roadstead.

(68.) The preceding remarks are those of Captain Hewett. Pimentel, and, after him, M. D'Aprés, has said that the winds of the northerly monsoon, between September and March, are from N.E. and E.N.E., or less northerly than as above; and that those of the southerly monsoon are from E.S.E. to S.S.E., or more southerly. It may, therefore, be admitted that they do sometimes prevail more from the South, and that those near the North but seldom occur.

(69.) Captain Hewett has observed, that the winds off Cape Frio are seldom found to the southward of East; and in the northern monsoon they are generally to the northward of N.E. Heavy and violent squalls are occasionally met with in rounding the cape, to obviate the effects of which every precaution is required.

The same officer adds, that at Rio de Janeiro the sea breeze varies in its commencement from ten to one o'clock in the forenoon, and ceases in the evening between the hours of seven and eleven. At the full and change of the moon violent squalls from the N.W., named by the Portuguese "Terre Altos," immediately superseded the sea breeze, lasting from four to six hours.

(70.) The Baron Roussin has observed that the general classification of the winds into two monsoons, according to Pimentel, &c., requires considerable modification; for, in his experience on the different parts of the coast, he found the winds very variable in the two seasons. For example, in five months of a southern monsoon they had not forty days with the wind E.S.E. or S.S.E., though, on another coast, easterly winds may more certainly be expected. The navigators of these coasts reckon much more on easterly winds than any others in the months of October, November, and December, which may be considered as intervening months between the monsoons.

In the midst of these varieties we find again certain particular winds; the one accidental, the others periodical, and which seem to be of a local and limited nature. Of this class are the S.W. squalls, which come on during the rainy season, at the times of new and full moon; the Brasilians call them Rebojos, and they prevail for three or four days; moderate when accompanied by rain, but with greater strength when the sky is unsettled.

The other accidental winds are of the nature of squalls, and are found principally in the environs of the Abrolhos, hence they are called "Abrolhos Squalls." They are most frequent in the months of May, June, July, and August, when the season is very wet, and the general wind from E.S.E. They proceed, it is said, from small white and round clouds, and with a force that is irresistible.

(71.) The land breezes on the coast of Brasil are nearly regular, and are felt at night during the greater part of the year. They are found on all parts of the coast between Maranham, in the North, and St. Catherine's, in the South, but vary in force and regularity according to the season and place. On approaching the Equator, the more discernible they become. At Rio Janeiro they occur daily, and seldom rise before 9^h p.m.,and do not finish till the morning of the following day. Such, too, is the case at *Espirito Santo*, *Porto Seguro*, *Bahia*, *Pernambuco*, and other places similarly situated.

During the northern monsoon the land breezes are more regular than in the southern monsoon; they are also stronger, because then the volume of wind comes more direct and beating constantly against the coast, the re-action causes a freshness in the weather on shore, which produces a more regular and stronger effect.

In the southern monsoon the winds are more variable to the S. and S.W.; the land breezes are mixed up with them and are not to be distinguished.

The sea breeze is mostly stronger and broader than the land breeze. This is the effect of vapour raised from the earth and accumulated in great quantity during the day; condensed afterward by the coolness of night, it falls and causes the air to expand with greater force.

(72.) Vessels cannot always be certain of finding the land breezes at a certain time in making for the ports of Brasil. But, in general, on advancing southward, following the coast, the winds in the rainy season will be found between South and West, and between the *Alagoa dos Patos* and *Cape Frio* it sometimes blows violently from between S.E. and S.W., and from the N.W., at times, there are hurricanes, similar to the *Pamperos* of the River Plate, which are dreadful. Of these, the prognostics are the same as of a European gale. If the sun sets environed with thick clouds, if the land appears very distinct, and seems to rise up, approaching the observer, you may expect the winds to blow from South to S.W. till it brightens up. Fortunately these gales do not long continue; when furious, they rarely last more than 24 or 30 hours, and their strength and duration diminishes on approaching the Equator. When the S.E. or S.W. winds of the southern monsoon are moderate, they come strong from the eastward during the day, and approach the West during the night.

So soon as the wind approaches the East, the weather always clears up. To the contrary when it turns toward the West, the mist comes on more and more thick. The winds are stated to come from the eastward in all their tropical seas; this is their natural course; the interruptions or changes which occur, in advancing to the land, are nothing but the crisis when passing from one to another. At 20 or 25 miles from the coast the general motions of the monsoons will be found.

(73.) The seasons of Brasil may be considered as two only—the *dry* and the *rainy*. On all the eastern coast the dry season commences near the end of September, and continues until February, and during the five months of its continuance thunder-storms frequently occur, but it seldom rains.

The rest of the year includes the rainy season; though the rains are not so constant as fully to justify the name. On the eastern coast the only months which may be thus considered are May, June, July, August, and sometimes a part of September. On the North coast the periods vary, for the heavy rains there commonly begin in December; although as on the eastern coast, they include May, June, July, and August.

(74.) PARA.—Situate immediately beneath the Equator, the climate of Para is hot and sultry; the thermometer averaging thoughout the day from 84° to 89° in the shade; and at night occasionally falling as low as 75°, with very heavy and copious dews, especially upon the river, wetting the boats as if a shower of rain had occurred. The river water is warm, generally 84°; as the air cools in the evening, it chills the surface of the water, and, in doing so, it emits steam or aqueous vapour into the cool atmosphere. Thus the fog, or mist, arises from the warm water of the river, and is not a deposit of dew from the atmosphere upon a surface cooled by radiation. Precisely similar to what occurs in the colder regions of the North, when water is rapidly losing its temperature, previous to freezing, it smokes with steam, and emits a vast volume of vapour, not a drop being deposited on the land; and it is to this that we must refer the mists and fogs, rising from the warm valleys, often before sunset, and not ascribe them to the deposit of dew from the atmosphere.

There is no difference of temperature throughout the year; the mean is 84°. As already shown, there are two seasons, the wet and dry. The wet or rainy season commencing in the latter end of December, and continuing until July, raining more or less every day for many hours, without intermission. The air is sultry and oppressive, with light variable winds, the most awful thunder and lightning, violent squalls of wind, occasionally from different points of the compass, and tremendous heavy rain. Ships are often detained several months, not being able to take in their cargo.

It generally begins to rain at about eleven o'clock in the forenoon, and continues until nine or ten at night. The early part of the morning from midnight is mostly fine. The thunder-storms take place most frequently in the afternoon, about 2^h or 3^h p.m. The same circumstance occurs at Rio Janeiro. The period of the hour of the storms is not confined to this place, but occurs at many others. The country is flooded in many parts during the rainy season.

The dry season at Para is from July to December. During this period rain is a frequent occurrence, and thunder-storms likewise in the afternoon. This is the windy season, it blowing fresh from the N.E. during the day, with a light breeze only in the evening. Lightning is frequent in the horizon every night.

Although, from the appearances of the banks of the Rio Para, its muddy beaches and masses of filth, it might be supposed to be the "centre of yellow fever," yet those who sleep on the river are generally healthy, and enjoy a fortunate exemption. Intermittent fevers or agues, however, attack new comers, and higher up the river they are more common. Those employed in the gathering of sarsaparilla are very frequently attacked with fever, and many natives die of it. Dysentery, tetanus, &c., are common. The small-pox, in 1825, is said to have destroyed 5,000 people, and to have proved the most destructive scourge they ever experienced. Hydrophobia is almost unknown.*

(75.) MARANHAM.—The wet season commences at Maranham in the latter end of December, or the early part of January, and continues until June or July; during the whole of these months an immense quantity of rain falls, the most awful thunder-storms occur, in which lightning is remarkably vivid. The weather is oppressively hot, and the wind light and variable, veering all round the compass in twenty-four hours. The dry season continues from July to December, in which period there is, generally, a fine fresh breeze from the N.E. or E.N.E. The nights are attended with lightning, but no thunder, and a few showers of rain sometimes occur.

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* Mr. Webster's Narrative of the Voyage of the *Chanticleer*, Appendix, pp. 339—342.

The climate of Maranham is naturally hot, and, as at Para, there is little variation of temperature throughout the year, the average being 82°. The general range of the thermometer is from 76° at night to 86° in the day, even in the most shady situations. The barometer ranges from 29.92 to 30.1, the average being 30 inches, and the horary oscillation about the tenth part of an inch; it falls from 9 a.m. to 3 p.m., and does not appear to be affected by the fall of rain.

The climate here is generally regarded as healthy, the most sickly time being during the transition from the wet to the dry season, or about July. The wet season is not considered unhealthy.

In the province of Seara, or Ciara, to the East of Maranham, the droughts are occasionally severe. A few years ago some thousands of persons perished from the want of water. Many fled to Rio Janeiro and to Maranham, and the crops were nearly all destroyed.*

The climate of *Fernando Noronha*, though abounding in vegetation and moisture, is very healthy. The dry season commences in July, and continues throughout August, September, October, November, and December. The wet season is from January to June, inclusive. In the first three months of the rainy season thunder and lightning are common; and heavy surfs prevail, especially about Rat Island, at the same period when similar surfs prevail at Ascension and St. Helena, as shown hereafter, with the wind light and variable from the N.W. In the dry season there is, at times, a very scanty supply of water here, but in the wet season a little deluge.†

(76.) Bahia.—Captain Mouchez, who spent a considerable time on this coast, has given the following on the winds, &c., here.

On the coast outside Bahia the trade winds generally vary four or five points in the opposite monsoons. They blow from the East during the months of February, March, and October; from S.E. by E. in April, May, June, July, August, and September; and from E.N.E. during November and December. This is shown in the illustrative chart.

(77.) In the roadstead of Bahia the wind comes between N.E. and S.E. for the greatest part of the year. During the S.W. monsoon, in June and July, there are frequent calms, storms from the N.W., and squalls from the S.W. This bad weather seldom lasts long, and the wind seldom gets so strong as to cause disaster; they are rather squalls of a few hours' duration, after which comes a calm, with the wind from the East. But at the times of the new and full moon during this season, the southerly winds, which blow sometimes for two or three days consecutively, send in a very heavy sea into the outer road, particularly during the ebb tide. These are very troublesome to shipping, and make the communication with the shore difficult. Squalls from N.W. bring bad weather, with thunder and lightning.

(78.) Storms are exceedingly rare at Bahia, but occur sometimes. That best remembered occurred on St. Joseph's day, March 19, 1817, which was a true hurricane, and caused great disaster to the lower town. These meteors are very rare to the South of the Equator.

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* Voyage of the *Chanticleer*, Vol. II., p. 60.

† Idem, Vol. II., p. 26.

What is called the winter season commences in March, and lasts till August. It is the rainy season, and that in which the heat is less, but many days are as hot as the summer time. There is great irregularity in the seasons.

(79.) In the summer the dews are extremely abundant, and give sufficient moisture to the soil to support vegetation. As on all parts of the Brasilian coast, the atmosphere is always charged with moisture, and its high temperature greatly facilitates the absorption of vapour, nearly to the point of saturation.

The changes of the land and sea breezes are very regular. Generally in the morning the wind is from N. to N.E., frequently very strong, and agreeably refreshing the atmosphere; and which, after an hour of calm, is replaced, about 10 or 11 o'clock, by the sea breeze from E.S.E. to S.E. In the evening, about sunset, this breeze sinks, and towards 8 or 9 in the evening, slight ruffles set in from various points of the compass at the head of the bay, which continue till sunrise, when they become stronger, and blow from N. to N.E.

(80.) Rio Janeiro, by Capt. Mouchez.—The *seasons*, as is frequently the case within the tropics, are not well marked at Rio Janeiro, and to this cause must be attributed the great diversity of opinions expressed by different authors. Travellers too frequently, judging from their own experience acquired during a few days' sojourn, and the few particulars acquired during the same period, are apt to generalize, and these opinions once expressed are then taken as authoritative. It will be better to base our conclusions on the exact figures acquired at the Observatory at Rio. This study of the climate of Rio and of Brasil in general becomes of more interest now that the yellow fever so often visits this country, and it would be important to determine whether there is any connexion between the climatic changes and the appearance of this scourge.

(81.) *Winds.*—In respect of wind, the climate of Rio divides the year into the northerly monsoon and the southerly monsoon. The first includes the autumn and winter (March, April, May, June, July, and August), and the second the remaining six months of the spring and summer.

(82.) During the southerly monsoon, the winds vary between S.S.E. and E.S.E., with frequent squalls from S. and S.W., which are the tails of the pamperos blowing on the shores of the La Plata, and either dying away or changing their direction before reaching the high mountains of the coast of Rio. They rarely have much strength when they reach the roadstead.

During the northerly monsoon the winds are from N.N.E. and E.N.E. To the South of Rio the seasons are still more contracted; they are less from the North.

(83.) The following abstract of the winds experienced at Rio is extracted from the work of Rear-Admiral de Chabannes, French I.N. It is arranged in a tabular form. This table shows the frequency of winds blowing from the sixteen chief points of the compass, and the calms. *Each of the figures represents the proportion per cent. of all the observations made during the month*, each horizontal line forming a total of 100.

It will be seen that southerly winds are most frequent in May and June, 17 in each 100, and northerly winds in January, 19 per cent. Calms are pretty nearly distributed over the whole year, from 23 to 30 per cent.

TABLE *of the* WINDS *and* CALMS *in the Road of Rio Janeiro, for each Month, showing the proportion per cent.*

	N.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.	S.	S.S.W.	S.W.	W.S.W.	W.	W.N.W.	N.W.	N.N.W.	Calms.	Total.
January ..	19	3	6	0	1	1	4	2	13	1	2	1	1	0	9	7	27	100
February ..	19	3	5	0	0	4	5	3	13	2	5	0	1	1	6	9	27	100
March	16	5	5	0	0	3	1	2	9	0	6	0	4	1	8	9	29	100
April	14	2	9	0	6	0	4	3	11	1	7	0	2	0	6	11	24	100
May	13	5	6	1	2	0	5	3	17	2	4	0	2	0	7	7	26	100
June	7	4	8	1	2	0	6	3	17	1	3	0	1	0	6	2	30	100
July	10	3	6	0	2	2	7	5	14	4	5	0	0	0	7	5	30	100
August	11	4	8	0	4	0	5	5	11	3	3	1	3	0	6	9	23	100
September..	14	6	10	1	3	0	4	4	7	3	4	1	2	1	6	7	26	100
October ..	15	5	11	2	1	0	4	3	6	2	3	2	4	0	6	9	27	100
November..	14	6	12	2	3	0	5	2	4	0	2	0	3	0	8	13	26	100
December ..	14	7	8	2	3	2	3	5	7	4	4	0	2	1	8	2	30	100
Mean for the Year...	14	5	8	1	2	1	5	3	10	2	4	0	2	0	7	8	27	100

(84.) VIRACAO, or the land and sea breezes, as has been before stated, the chief feature of the winds at Rio, is the change from the land to the sea breeze. During the night and in the morning the variable winds which come from the surrounding mountains are felt at 6 to 9 miles from the coast. They vary according to the locality between N.E. and N.W., and are sometimes very fresh; they lull in the morning, and it becomes calm about 10^h. About 11^h or 11½^h the sea breeze enters the bay, and is seen by the ripples on the sea; it increases in force in the afternoon, and falls calm at sunset. These changes are called the Viraçaó, and occur at all times, but in bad weather.

These diurnal variations are felt for some miles off the coast, and their constancy greatly facilitates navigation, and regulates the time of entering and departure of ships.

(85.) *Storms.*—Bad weather and heavy winds are extremely rare at Rio. Hurricanes are almost unknown, but gales and squalls, always very sudden and of short duration, are sometimes very violent. That which occurred on June 12, 1817, was very sudden; it only lasted about 20 minutes, but was so violent that 220 people perished in the roads in boats, overtaken by the squall. It is in summer, January and February, that they are most frequent, the monthly average of days on which thunder occurs in this season is five. The mean annual number of days on which storms occur during the six years was 21, a number very far inferior to what is usually stated.

(86.) It is generally after a hot day, about the time of sunset, that they set in, and they frequently bring a deluge of rain, which changes the city into a lake, covering it to a depth of 1 or 2 ft. in water.

The storms usually commence in the N.W. of the roadstead, and pass toward the Organ Mountains, when they come up to N.E., the sea breeze, which gradually sinks, and then suddenly it bursts from N.E. or N.; the gale then breaks with all its violence on the road.

If the clouds begin to collect on the chain of the Organ Mountains with northerly winds, the storm will be of still greater violence; but this occurs but rarely.

(87.) Winds which bring rain come from the South, S.S.W., S.W., or W.S.W. In rainy weather, if the wind shifts from S.W. to West and to North, it will continue bad, but if it turns by S.E. and East it will become fine, which accords generally with the law of gravitation in the Southern Hemisphere. The summits of Tijuca serve the inhabitants of Rio as a weather guide; if they are covered with clouds, it is nearly a certain sign of rain, particularly in May, June, July, and August.

(88.) *Rain.*—The year is generally divided into two seasons, the wet and the dry; the latter comprehends the months between April and September, the second the remaining six months. But this rule has many exceptions, which accounts for the diversity of opinion recorded on the subject. For if the storms of summer bring sudden and inundating rains, it occurs frequently that the pamperos or southerly winds of winter so cool the air and cause rain of longer duration, and consequently of greater quantity. In autumn and winter the rain often lasts a very long time; in 1811 it fell incessantly for one hundred days, causing great troubles in the city. The month of August is the mean period for the most abundant rain fall. The quantity of rain varied, during six years' observation, between 51 inches in 1855, and 32.5 inches in 1853, average 42.5 inches. In the dry season, abundant dews replace the rain and support vegetation.

3. Winds on the Coast of Africa, &c.

(89.) In the preliminary part of this section sufficient has been said to show that the influence of the large continents of Africa and America is very great in deflecting the normal direction of the trade winds, and in causing an undue expansion of the intervening space of calms which separate the northern and southern systems, and this is especially apparent on the African side.

(90.) In the ensuing remarks we shall give the deductions and remarks of different writers, referring generally to special sections of the coast, as has been done in the case of the Brasil wind systems, and prefix to these the valuable essays by Lieut. Brito de Capello and Capt. Toynbee; remarks by the former on the relative force of the winds in the Atlantic are given on pp. 41 to 48, and therefore what follows may be considered as supplementary to that portion of this work. They are illustrated by the diagrams of the arrangement of the winds and calms in the respective seasons, which, by the aid of the verbal descriptions which follow, will give a clear insight into the very peculiar features of the meteorology of the central portion of the Atlantic Ocean.

(91.) Lieutenant Brito de Capello has derived his data from the rigid investigation of a large number of logs of ships of war and merchant vessels, sailing between Lisbon and the Portuguese settlements at Angola, Benguela, and the Bight of Biafra, routes which are specially adapted to develope the peculiarities of the complicated wind and current systems necessarily traversed. Added to these are a number of logs sent to him by Mr. Andrau, director of the most useful Netherlandish Meteorological Institute at Utrecht.

(92.) *December, January, and February.*—During these three months the N.E. trade winds are proceeding southwards, and attain their southernmost limit in February and March. In general the wind is stronger, according as the distance from the African coast is increased, and its direction is greatly modified as it is neared; it then comes to be a N.N.W. or N.W. wind.

The force of the wind also diminishes gradually as the southern limit is approached. It decreases until it is lost in the region of calms and variable breezes in such a manner that the southern edge of the N.E. trade is not parallel to the Equator, but is nearly in an E.N.E. direction. In December this line is found in 28° W., in lat. 6° N., and reaches the African coast in 11° N. In January the southern edge has already gone far to the South, and runs from 5° N., in the same meridian towards the coast in 9° or 10° N. In February this line runs from 3° 30′ N., and reaches the coast in 8° N.

(93.) *Zone of Calms.*—Between the N.E. and S.E. trade winds, at this period of the year, there is a large space of a triangular form, the base of which rests on the African coast, and entirely occupies the space between the trade winds, and shifts its form and position with the progress of the season.

In December this calm zone seems to be bounded on the South by a line running from 28° W. and 4° N. to 3° N. on the meridian of Cape Palmas. The S.E. trade winds blow to the South of this line, but they are usually very light, and come from the South and S.W. to the East of the 20° meridian. This area is occupied by winds so feeble and variable, that a vessel could not make more than 1.1 to 2.5 miles an hour, and frequently calms are encountered which last for 8, 16, or 24 hours, which are interrupted by storms of rain and wind, generally coming from N.E. to S.E.

In January this calm zone is rather narrower, because its southern edge is more inclined to the North than the northern, running from Cape Palmas to 2° or 3° N. on the meridian of 28° W.

In February these calms are still narrower; their lower edge runs from Cape Palmas to the meridian of 24° W., between 1° and 2° N. The rate of sailing is greater at this time than in the two preceding months, being generally above 2 miles an hour, and storms are more frequent.

In the calm zone, during these months, variable breezes predominate, and come from N.E. and N.W. quarters in a band parallel to its northern edge; from the N.W. quarter, on the African side, and from the N.E. on the opposite side. Near its southern part the variable breezes are frequently from the S.E. and S.W., from the latter direction when nearest to the African coast.

The region of the S.E. trades is to the southward of the zone of calms, but their direction for a great portion of their extent on the African coast is much modified; they haul to the S., to S.S.W., and to S.W. near the land. The area of the S.E. trades, properly so called, may be considered as limited to the part lying westward of a line intersecting the Equator at 14° or 16° W., passing through the meridian of Greenwich at 7° S., and through 3° or 4° N. in long. 16° W.

To the East of this line the wind generally blows from the S. and S.W. During the month of December, it is very feeble in all the Gulf of Guinea, chiefly on approaching the coast, when it is accompanied with storms coming generally from N.E. quarters. In January, in this part, the wind is fresher, and still more so in February. Storms are more frequent in this latter month.

(94.) *March and April.*—In these two months the position of the different wind systems may be considered as stationary, and analogous to those found in February.

In March the southern limits of the S.E. trades are very nearly the same as in the preceding month. Between the meridians of 22° and 24° W., between the parallel of 14° N. to its southern edge, it blows from the northward or more exactly from N.N.W. to N.N.E. To the eastward of the meridian of 18° W. it blows from the N.W., veering to W.N.W. near the coast; to the West of 20° W. the wind is N.N.E., then N.E., and further on more easterly and more fresh.

In April the strength and direction of the N.E. trades are very similar to those of the preceding month; the mean southern limit seems to commence its retrograde movement; from the parallel of 4° 30′ N. on the meridian of 28° W., it runs towards the African coast, where it is met with in about 10° N.

In March the zone of calms is little different from February, but its southern edge is farther South; it follows the parallel of 1° N. in 22° W., and thence reaches Cape Palmas. But calms predominate more to the westward of the meridian of 19° W.; on the land side light airs and variable S.W. breezes are met with. Storms are still frequent, and come from various quarters.

In the month of April the calm zone is a little further from the Equator. Its mean northern limit is rather more North, and its southern edge is about one degree farther northward, being met with in 2° N., and about longitude 28° W., from whence it passes towards Cape Palmas. In this calm space storms are not so frequent as in the preceding month. A line passing through 18° W. and 2° N., the Equator and 12° W., and through 5° W. between 4° and 5° S., seems to separate the true S.E. trades from the winds attracted toward the East by the effects of the African continent. Storms and calms are still frequent, particularly in March, and they extend considerably to the Equator.

(95.) *May and June.*—At this period the two trade winds shift their position. The mean line separating them is removed nearly 6° in latitude in a parallel direction The space occupied by the N.E. trade is then very narrow, and its strength is sensibly diminished, although its general direction remains unchanged.

In May the line of separation between the N.E. trades and the calm zone passes from 6° N. on the meridian of 28° W. towards 11° N. on the African coast, so that it has travelled 90 miles northward since the preceding month, or at the rate of 3 miles per day.

In June this line is much farther to the northward, and it is fully 3° farther North, its rate of progress being at least 6 miles per day. In the narrow space occupied by the N.E. trade wind, its force, as may be conceived, is much lessened, and its direction is more westerly near the land.

In May the line separating the S.E. trades and the calm zone, seems to go from 3° N. and 28° W. toward the African coast in 5° or 6° N. Calms are less frequent than in April, and between the meridian of 20° W. and the African coast; although they are more or less from the S.W. and light, it shows clearly that the S.W. monsoon has set in, at least in 7° N.

In June, a line drawn from 5° N. and 28° W. to the African coast, in 7° or 8° N., will separate the two regions. The S.W. monsoon seems to be well established, and also in the calm spaces East of the meridian of 24° W. the winds are light, and come more from the S.W. in the southern part, and from the West and N.W. in the northern part. During these two months storms are much less frequent than in the preceding periods; but by way of compensation it is the season for hurricanes on all the coast from Cape Palmas northward.

A line which cuts the meridian of 14° W. in 2° N., the Equator in 9° W. and 4° 40′ W. in 2° S., seems to separate the S.E. trades properly so called from the southerly and S.S.W. winds. In May the S.E. trades are fresher than in June.

(96.) *July, August, and September.*—This is the period when the S.W. monsoon is fully developed; the calms of the preceding periods are replaced by S.W. winds, more or less fresh and irregular, and accompanied by heavy rains, and leaving only a zone of 2° or 3° breadth between the N.E. trades and the S.W. monsoon, on which calms and variable breezes still prevail.

In July there is a small space on which the N.E. trade blows; its southern edge lies in an E.N.E. direction, passing through 12° N. in long. 28° W. This line continues to advance northward at nearly the same rate as in the preceding month. From July to August it still continues moving northward, though much slower. In the latter months the southern limit of the N.E. trades is found to the North of the parallel of 14° N. The line separating the S.E. trades from the S.W. monsoon cuts the Equator in 10° W., and the meridian of 4° 40′ in 5° S. At this period, especially in the two last months, the S.E. trades as well as the S.W. monsoon, and the S.S.W. winds in the Gulf of Guinea, are generally fresh. Near the coast of Angola, at this period, the winds are light, more so than at any other period of the year.

(97.) *October and November.*—In October the N.E. trade winds have already advanced southward; their southern edge is in 10° N. and 28° W., and in 14° N. on the coast of Africa, very nearly as in June. In November their southern edge has advanced 3° southward. In October the region of the S.W. monsoon has much contracted, and has much decreased in force; on the other hand the zone of calms and variable breezes has extended still farther, and now has a breadth of more than 4° beyond the southern edge of the N.E. trades. To the South of this space of calms, beyond the meridians of 22° or 24° W. going towards the land, the S.W. monsoon is encountered; the S.E. trades blow to the West of these meridians.

In November the region of calms and variables may be considered to comprise all the triangular space between the N.E. trades and the parallel of 4° N.

to the coast of Africa. In this month the sailing rate is even less than in December, and in many parts there is not wind enough to command a greater speed than between 1 and 1½ knots per hour.

The S.E. trades, like S.W. winds near the land, are brisk at this period. On the Angola and Congo coasts the wind generally comes from S.W. to W.S.W., and is fresher than at any other part of the year.

The line which separates the S.E. trade winds from those deflected by the action of the land passes through 4° N. on the meridian of 22° W. through the Equator in 12° W., and through 5° S. in 4° 43′ W.

(98.) The following are Capt. Toynbee's remarks which accompany monthly charts* of the prevailing winds in the region of the Atlantic, between lat. 20° N. and 10° S. and long. 10° to 40° W. In the chapter of this work devoted to Passages, some illustrations will be found, together with Captain Toynbee's remarks on the best route across the equator.

January.—Since December the N.E. trade has advanced about 2° to the southward on the western side of the district, where it now prevails to the Equator, but it holds much the same position as in December on its eastern side, where it becomes light and northerly, changing into a very light north-westerly wind near the S.W. coast of North Africa. It has decidedly increased in force since December, especially between 20° and 10° N. In square 40 it is very squally and gusty, much more so than in the squares to the eastward, which is the more remarkable, as square 40 is open sea, whilst square 39 contains the Cape Verde Islands. Perhaps the proximity of square 40 to the area of high pressure may have something to do with it, as the gusts often come with a clear sky and with very little wind between them, as though they were the effect of downward rushes of dry air. Sharp gusts with blue sky, very cool weather, and the atmosphere very transparent, are frequently met with at the polar verge of each trade.

The S.E. trade only prevails to the Equator on the western side of the district, and to 4° N. in its central part; on its extreme eastern side there is a prevailing southerly wind up to 8° N., but it is very light, and the weather very unsettled. The S.E. trade has decidedly decreased in force since December.

February.—The N.E. trade has advanced nearly 2° to the southward since January; it now extends to about 4° N. on the eastern side, and to the Equator on the western side of the district. It still falls light and becomes north-westerly near the African land. Between 20° and 10° N. it has decidedly decreased in force since January, whilst between 10° N. and the Equator its force has increased. It is still very gusty in square 40; in some cases the gusts are strongest when the sky is clear, and are called "hard clear squalls."

The S.E. trade prevails to 2° N. in the central part of the district, whilst on its extreme eastern side a light south-westerly wind prevails between 4° and 6° N., where it is met by the light north-westerly wind of the N.E. trade. The S.E. trade has decidedly decreased in force since January. In square 302 there is frequent mention of squalls or sudden shifts of wind from S.E. to N.E. as though the upper current of air sometimes forced its way to the surface of the earth.

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* "Meteorological data for the nine 10° squares of the Atlantic, which lie between lat. 20° N. and 10° S., and extend from long. 10° to 40° W.," published by authority of the Meteorological Committee, 1876.

March.—The N.E. trade holds much the same position in the central part and on the eastern side of the district as in February, but it has advanced to the southward of the Equator near South America. Its direction has become more northerly and north-westerly on the eastern side of the district than it was in February, where it also continues to be much lighter than on the western side. It has decreased in force since February. Square 40 is still remarkable for having strong gusts of wind, and in some cases it is recorded that they are stronger with a clear than with a cloudy sky.

The S.E. trade still prevails to 2° N. in the central and eastern parts of the the district, and between 15° and 20° W. a south-westerly wind is found to prevail as far as 8° N., where it meets the prevailing north-westerly wind of the N.E. trade, both blowing towards the area of lowest pressure. It seems to have slightly increased in force since February.

April.—The direction of the N.E. trade is very similar to that in March, it being still north-easterly on the western side of the district, northerly between 20° and 25° W., and drawing into a light north-westerly wind on its eastern side, where it extends 2° more to the southward than in March. Between 20° and 18° N. there has been but little change in its force since March, but to the southward of that latitude it has decidedly decreased. Gusts of wind are rarely reported in square 40, but puffs are still very common, and much more frequent than in square 39.

In this month tornadoes commence on the S.W. coast of North Africa, where the northerly wind is giving way to the southerly. They generally commence with a south-easterly gust, and then back to the eastward, sometimes working round until they end at S.W.: but their action does not seem to be always the same. See the remarks on the N.E. trade in October for further particulars.

The S.E. trade only prevails to 4° S. on the western side of the district, but it extends to 4° N. on its eastern side.

The prevailing south-easterly wind shown between 10° and 8° N. on the eastern side of the district is the result of only one observation, whilst the north-westerly winds in the adjacent spaces number 30, so that north-westerly winds may be supposed to prevail there. The S.E. trade has slightly increased in force since March.

May.—The direction of the N.E. trade is very similar to what it was in April, though rather more easterly between 20° and 25° W.; its force has increased in the northern part of the district, but decidedly decreased to the southward of 10° N. It has generally receded fully 2° before the S.E. trade, but on the eastern side it has given way 4°. The N.E. trade is still much more gusty in square 40 than in 39, and the gusts are sometimes heavy with clear weather. Gusts and puffs were also common in the northern part of square 4.

The S.E. trade prevails to the Equator on the western side, and a southerly wind to 8° N. on the eastern side of the district; besides gaining so much on the N.E., the S.E. trade has decidedly increased in force since April.

June.—The direction of the N.E. trade continues very similar to what it was in May, drawing into a north-westerly wind near the coast of Africa. Its force has decidedly increased between 16° and 20° N., but decreased to the southward of 16° N. It has generally receded 2°, and in some parts of the district 4°, to the North. It is still much more gusty and puffy in square 40 than in square 39.

The S.E. trade prevails to 6° N. except on the extreme western side of the district; on its eastern side south-westerly winds prevail to 8° N., and even to 10° N. between 15° and 20° W. The S.E. trade has very decidedly increased in strength since May.

July.—The N.E. trade still draws more northerly, and eventually north-westerly, as it approaches Africa; its force has very decidedly decreased since June, and it has receded nearly 4° before the southerly wind. In square 40 it is very much more gusty than in square 39, so much so that although square 39 has nearly four times as many wind observations as square 40, it has not nearly so many gusts and puffs.

The S.E. trade now prevails to 10° N., and there is a prevailing S.S.W. wind up to 12° N. on the eastern side of the district; between 12° and 14° N. on the same side, the prevailing wind is W., and to the northward of that latitude it is north-westerly. The navigator who has passed from the northward between the Cape Verde Islands and Africa in July, will remember how the wind changed from N.W. to W. and S.W. as he sailed to the southward; in the spaces between 16° and 10° N., and 15° to 20° W. the wind diagram gives a picture of the winds sailed through. The S.E. trade has increased in force since June, especially the southerly wind to the northward of the Equator.

August.—The N.E. trade is still lighter, more northerly, and in some cases north-westerly, near Africa. Its force has decreased since July, and it has receded about 2° to the northward, its southern limit being in about 12° N., its most northern verge for the year.

The S.E. trade prevails to 6° N. on the western side of the district, whilst the prevailing southerly wind now extends to 14° N. on its eastern side. The diagram shows that between 14° and 8° N., north-easterly and south-westerly winds prevail in spaces which lie abreast of each other, and in the same latitude, the N.E. being to the westward of the S.W.; such a state of the atmosphere makes it probable that whirls revolving similarly to West India hurricanes will be formed, and suggests that this is their birth-place, which has been proved true in some cases. On the northern side of the Equator the force of the S.E. trade has very decidedly increased since July, but it has not changed much in the South. It is more southerly, unsteady, and squally near South America (in square 303) than in the squares to the eastward.

September.—The N.E. trade has generally increased in force, but is blowing in nearly the same part of the district as in August.

The southerly winds North of the Equator continue to blow over the same part of the sea as in August; they also continue to draw into south-westerly winds as they approach the area of lowest pressure near the West Coast of Africa; their force has very decidedly decreased since August. To the southward of the Equator the S.E. trade has decidedly increased in force since August.

October.—The N.E. trade has advanced several degrees to the southward, especially on the eastern side of the district, and now prevails to 8° N.; by this change it has extended over that part of the sea where there is the highest temperature of both air and sea, so that instead of north-westerly and south-westerly winds blowing into the area of highest temperature, there is a hot N.E. wind blowing from it! The N.E. trade has increased in force since September. This is one of the seasons for tornadoes on the S.W. coast of North Africa. They occur where the northerly wind is giving way to the southerly, or the southerly to the northerly, as these winds work their way to the northward or southward, so that their season varies with the latitude, but they may be said to begin on the southern part of this coast in April, and to work their way northward during the summer months; then as the northerly wind advances to the southward they are felt again on the southern part of the coast in October. They generally commence at S.E., and the wind backs to East, sometimes going round to S.W.

The S.E. trade prevails to 8° N. It has very much decreased in force since September, especially in the southern part of the district. Easterly squalls, veering from N.E. to S.E., are very common between the trades in October.

November.—The N.E. trade has advanced about 2° to the southward since October, and now prevails to 6° N.; it still extends over the hottest area of air and sea, and (as in October) has not that tendency to draw into a north-westerly wind near the coast of Africa which it had in previous months. In the most northern part of the district it does become more northerly near Africa, but in about 10° N. it becomes more easterly again, and draws away from the land. The N.E. trade has decreased in force near its northern, and increased near its southern limits since October; the percentages of south-easterly and south-westerly winds have much increased in the northern part of the district since October, which indicates that the northern limit of the trade is not very far North of the district in November.

The S.E. trade prevails to 6° N., and (as in October) it has fewer south-westerly winds at its northern verge than in previous months; to the southward of the Equator it has increased in force since October, but scarcely changed to the northward of it.

December.—The N.E. trade has advanced 2° to the southward since November, and now prevails to 4° N. Near the African coast the wind again becomes light, and more northerly, changing even to north-westerly between 6° and 10° N., but the prevailing wind still blows north-easterly *from* the hottest air and sea. The most remarkable feature in the direction of the N.E. trade in December is its prevalence from East between 10° and 20° N. and 25° to 30° W.; between 18° and 20° N., 40 per cent. of the wind observations are from East, or some point to the southward of East. It seems most probable that this remarkable difference in the direction of the wind is caused by the Cape Verde Islands, though it is difficult to say why they should not have a similar effect in some other month. This is the month in which the Harmattan sets in on the S.W. coast of N. Africa, and the Admiralty Pilot Charts show that it is also felt at the Cape Verde Islands. The N.E. trade has decidedly increased in force since November. Considering the number of wind observations in each square, the percentage of gusty and puffy winds is much greater in square 40 than in square 39. In square 40, between 16° and 17° N. and 34° and 35° W., there were heavy squalls without either clouds or rain. Fine weather winds and squally winds having a force 7 or upwards are more common in square 40 than in 39.

The S.E. trade prevails to 4° N. It has very decidedly decreased in force since November.

Conclusion.—The N.E. trade sometimes seems to curl round the coast of Africa in the same way that water does round a rock, whilst the current arrows show that the sea surface has a similar motion. The trade is weakest in that part of the sea where the difference of temperature of both air and sea is greatest, which is contrary to the theory of some meteorologists (see the diagrams for April, &c., &c.). Sometimes the wind seems to blow from warmer towards cooler air, as shown in the diagrams of October and November.

The remarkable clear-weather gusts experienced in square 40 have been remarked upon in the course of this work as probably downward rushes of air. The unsettled wind and weather which are sometimes experienced in this square, seem to be caused by a collision between upper and lower currents of air. In some instances rain is said to fall from the upper stratum of cloud.

The "Remarks on Wind" show that the N.E. and S.E. trades are often more easterly in direction, and weaker in force, during the night than during the day. They also seem to show that the weather is slightly more squally during the night than during the day. One ship had squalls at 6 a.m. for four consecutive mornings, and another had them at 7 p.m. for three consecutive evenings.

Attention has been called to the fact that in December, the commencement of the Harmattan season, the N.E. trade is diverted into an East wind on the western side of the Cape Verde Islands, whilst to the eastward of them it blows from N.N.E. It has also been shown that during the southern winter the wind and weather near Cape St. Roque are much more unsettled than they are in parts of the sea lying in the same latitude, but farther East; also that the wind becomes very southerly near the South American coast, whilst in the southern summer it is very northerly.

It should be clearly understood that whilst the diagrams only show the wind from that point of the compass which has the largest number of observations, a great variety of other winds blow in those parts where the two trades meet, especially in the atmospherical eddy which curves round the south-western part of North Africa; into it the northern verge of the S.E. trade is drawn as a light south-westerly wind, where it meets the southern verge of the N.E. trade drawn into a N.W. wind, and the result of their meeting is great confusion of light airs, calms, squalls, rain, thunder, and lightning of the most awful kind, together with waterspouts, &c., &c.

(99.) The following observations by Capt. Midgley will be found of great service, in addition to those just given by Lieut. de Capello and Capt. Toynbee.

I have generally found the limits of the N.E. and S.E. trades accurately described in the Table published in the Memoir of the Atlantic Ocean; and add my humble testimony to the accuracy of the remarks on the African Currents by the late learned and respected Major Rennell. The third section of the Observations on Currents in the North Atlantic Memoir, should be carefully studied *and acted upon* by every prudent mariner bound to the Bights of Benin or Biafra, or indeed to any part of the windward coast; it is an accurate and valuable account of the Guinea Current, and may be considered as an unerring monitor, which warns the mariner against its treacherous influence; for when this current runs with its greatest strength, the weather is so wet and squally, that observations cannot often be had, sometimes for days together.

I will here offer a few remarks on the general variable winds and weather which prevail between the parallels of 4° and 10° N., and the meridians of 18° and 25° W., or between the N.E. and S.E. trade winds.

The winds generally incline from the southward, between the trades, and few vessels pass from one trade wind to the other without meeting with very unpleasant weather, in the shape of calms, light baffling winds, squalls, and rain, particularly when the sun is much to the northward.

In June, July, and August, heavy squalls seem to prevail from the S.W., with a great deal of rain, and the wind often blows hard from this quarter for several hours together, and then falls calm, leaving a heavy and confused short sea which causes a vessel to labour and strain more than she would do in a gale of wind.

When the sun is far to the southward, the weather is comparatively fine, with light southerly and S.E. winds, occasionally, however, interrupted by squalls and rain; and the calms are of shorter duration, owing, probably, to the limited breadth of the space between the trade winds at this season.

In this part of the ocean, when much lightning is seen in a heavy dense cloud, in any quarter of the compass, the wind may be expected to come out suddenly from that quarter, especially if there is any rain, even though the wind may be blowing at the same time with moderate force from an opposite quarter.

Forked or chain lightning is the almost sure forerunner of a heavy squall; it is a monitor whose warning should not be neglected.*

Whenever there is much lightning, and the wind is unsteady and baffling about, prepare for a change. A heavy dense cloud, having a squally appearance, may rise and pass slowly over the vessel directly to leeward, with little or no increase of wind; and when the danger may be supposed over, the vessel is suddenly taken aback with a smart squall. This, I presume, arises from the cloud which has just gone over the ship, being opposed in its progress to leeward by a stronger current of air from the opposite quarter. On this account, when clouds are in motion from opposite quarters of the compass, a better look-out, if possible, should be kept to leeward than to windward.

Keeping a good look-out upon the surface of the water is an excellent method of judging of the force of wind in an approaching squall; but on account of the heavy rain which invariably accompanies the squalls alluded to, very little sound judgment can be exercised with respect to their strength;

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* In those parts of the North Atlantic Ocean which are not in the general influence of the trades, I have very frequently remarked that lightning is indicative of a change of wind.

they are generally, however, tolerably heavy, and require sail to be considerably reduced.

In June, July, and August, the weather is very wet and squally. Sometimes dense masses of clouds are seen in rapid motion from the S.E., southward, and S.W. quarters of the horizon. These clouds have a bulky and confused appearance, as if tumbling or rolling over each other, and are of a dirty, dark drab colour, with ragged edges, and inky-looking small clouds flying about the edges of them. In their approach towards the zenith they gradually appear to unite and form the apex of an angle, and thus united blow with incredible violence from the S.W. quarter (veering about two or three points or more) for upwards of two hours, during which time the rain descends in torrents, perhaps accompanied by a waterspout or whirlwind.

Ships should be well prepared for these dangerous visitors, for they come with a similar violence to the arched white squall of the West Indies. I have experienced two squalls of the above description (both in the month of July), and in one of them lost a good fore-topsail, after the reef-tackles, &c., were hauled out snug, and the ship had been for some time running directly before the wind. Upon both occasions my barometer fell three-tenths of an inch very suddenly, which enabled me to take in sail in time; for the squalls did not look particularly alarming until about eight or ten minutes before they reached the ship.

To the inexperienced in this part of the ocean, I would beg to remark, that much sheet lightning is always suspicious, and forked or chain lightning universally so; and the latter is, in some degree, indicative of a change, as well as of an increase of wind.

After the wind has blown steadily, with fine weather for a few hours, and it then begins to be variable, and fly suddenly about, squalls and rain may be expected.

The moon has great influence on the weather; for it is mostly squally and unsettled, with much rain, about the full and change.

I perfectly agree with Captain Cheveley, that the month of July is perhaps the worst in the year for making southing between the trades. I have made two homeward passages in July between the meridians of 22° and 26° W., and met upon each occasion with the same weather as described by that gentleman; namely, strong S.W. winds, hard squalls, and torrents of rain, with a heavy sea, and northerly currents.

(100.) *African Coast.*—Commander E. G. Bourke, R.N., F.M.S., remarks: The winds on these coasts are already so well known as to render much comment unnecessary, the usual sea and land breezes being, with few exceptions, constant; the latter however are nowhere very strong, and as a rule are not felt before midnight, nor do they last later than 8 a.m. The sea breeze commences about 10 a.m., reaches its maximum strength at 4 p.m., and then gradually falls light, but frequently, and especially in the Gulf of Guinea, it maintains its full strength until it suddenly drops, and gives place to the land breeze. The sea breeze blows from West to N.W. to the North of Cape Palmas, to the South of that point it is from S.S.W. to W.S.W. true. North of Cape Palmas the land breeze comes from East to E.N.E., from Cape Palmas to Fernando Po from the N.W., thence to Cape Lopez (1° S.) from the East, and to the South of that cape it is from the S.E. These breezes extend nowhere far from the shore, as at a distance of 20 miles to seaward the constant S.W. monsoon is but rarely disturbed, and then only by tornadoes and the Harmattan.

The chief characteristic of the climate of the coast of Western Africa is moisture, which is accompanied by a temperature by no means high for the latitude. This averages between the Equator and 10° N. 79°; from the Equator to 10° S. it is from 4° to 5° lower; to the South of 10° S., the rainy season becomes less and less marked until reaching 16° or 17° S., where rain is scarcely known. From this to 25° S. the climate is most peculiar, it being rainless with the wind constantly blowing from S.S.W. to S.S.E., and with a temperature always low for the latitude. At Little Fish Bay (15° S.), in July, 1865 (the coldest month of the year), the maximum temperature was 61° to 63°, the minimum being 56° to 58°; at the same place in December, 1872 (a hot month), the maximum was only 70°, and the minimum as low as 62°, all these being very low for a place within 15° of the Equator. Off Cape Frio the diminution of temperature is even more remarkable, it being in December, 61° to 65°, in April, 70° to 73°, and in June only 58° to 60°.—(*Journal of the Meteorological Society*, Vol. iv., 1878, pp. 25, 27.)

(101.) Seasons.—On the windward coast, from January until May, the weather is commonly fair and clear, with cooling breezes and gentle westerly winds. But about the middle of May the South and S.E. winds begin, accompanied, not only with hurricanes and stormy gusts, but also with thunder, lightning, and great rains, which vary, more or less, until January, as shown in the following description.

The Baron Roussin says that on the whole extent of the African coast there are but two seasons, namely, the rainy and dry seasons. The division of the two is connected with the periods when the sun crosses from one hemisphere to the other, and is modified as he advances to, or recedes from, the Equator.

The Rainy Season.—The rainy season commences at each place on the coast to the northward of the Equator at the time when the sun passes the zenith of that place in his course to the northward. It is usually during the months preceding this event that the change of weather takes place. It may, therefore, be calculated that, at the Isles de Los, which lie in 9½° N., the first violent squalls do not occur before the 10th or 15th of May; their arrival seems to be affected by the moon; for they almost always commence, and are most violent on the days of new and full.*

(102.) Lieutenant Bold also says, that the winds and weather on all parts of the windward coast are much alike, excepting that the rains commence rather earlier in the S.E. The wintry season makes its appearance early in June, by strong breezes and occasional heavy gusts from the southward and S.E., accompanied with rains, that increase violently and continue until the latter end of August; this is succeeded by a series of close foggy weather, during which the land appears enveloped in vapour, occasioned by exhalations from the humid land. This is justly considered to be the most pernicious season in the year to the European constitution; the whole atmosphere being then impregnated with deleterious matter, generated by decayed vegetation. During the rains there are no land winds, neither in the month of October, when the wind is strong down the coast, and in the following month gradually draws down to the South and westward, with occasional rain. Toward the middle of December the weather begins to clear up, and the summer season to make its appearance; this continues until June, with a beautiful clear sky and gentle refreshing breezes from the S.S.W., during the last ten or twelve weeks of which the tornadoes prevail very violently; but these come on generally in the evening, and give ample warning to the navigator to prepare against their dreadful impetuosity.

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* Captain Adams, in his sketches, says that the wet season, North of the Equator, commences in the month of May, and terminates in July, when the dry season begins; although heavy showers of rain fell during the months of October and November, which enable the Africans to reap a second harvest of maize; but the rains commence and terminate six weeks earlier near the equator than at the northern boundary, where the periodical rains cease.

The same intelligent navigator adds:—The seasons on the Gold Coast are precisely similar to those of the Windward Coast, with the exception of their successively commencing a month earlier. Along the coast, in the winter season, when the winds are from the S.W. the swell and surf on the beach are excessively high, and too dangerous in many parts to permit landing.

The seasons on the coast of Dahomey, &c., are nearly similar to those of the Gold Coast; the rains commencing in May, which are preceded by the tornadoes and equally boisterous weather, with southerly and S.S.E. winds from the month of March, causing a heavy sea in the bight, with a violent surf along shore. The finest months here are from September to March, during which the winds are from W.N.W. to W.S.W., with cool refreshing breezes by day, and land winds at night. But it is to be observed that, in the rough season and the winter months, there are no land winds, and the current is frequently found running rapidly to windward.

The Tornado derives its appellation from the Portuguese, signifying a whirlwind. It is known on all the coast of Africa, between the Rio Nunez, in lat. 10½° N. and the Equator, but is most severely felt on the Windward Coast, and seems intended by Divine Providence to expel the noxious matter with which the air is so frequently charged. The tornado first announces itself by the appearance of a small silvery cloud in the zenith, which gradually increases and descends towards the horizon, and becomes veiled over with the most impenetrable darkness: at this moment the functions of nature seem to be paralyzed, and the elements to have ceased their operations; the most profound and solemn stillness reigns around, with scarcely a breath of air from the heavens, in consequence of which the whole physical system feels oppressed with sensations of approaching suffocation; violent and reverberated peals of distant thunder and lightning commence, gradually advancing and increasing to an extreme not easy to describe; the atmosphere, at times, in a continued blaze for minutes, without intermission: at length the gust arrives with sometimes the greatest irresistible violence, the impulse of which no sails can frequently withstand. It is fortunately not of long duration, extending from one to three hours, and concludes with a furious deluge of rain, that descends rather in columns than in drops. The great danger is in the sudden impulse of the gust, which would immediately dismast or overturn a vessel unprepared for the event. Nothing can be more exquisitely delightful than the subsequent clear and pure state of the air, creating an apparent regeneration of the animal as well as of the vegetable world.

Commander E. G. Bourke, R.N., says:—Tornadoes are met with as far as 10° S., and almost always come from the eastward, or dead against the prevailing winds: they do not appear to have any rotatory motion, and have scarcely any effect on the barometer; if they cause any change, it is a slight rise on their approach. This is to be looked for, as they work dead against the usual wind, and the two currents of air seem to meet; certain it is that the S.W. wind blows till the squall reaches the observer, when a sudden change occurs to the N.E. It appears to me that the cold upper current of air forces its way against and under the exceedingly hot and moist lower one, forcing it upwards, where it is rapidly condensed into angry-looking clouds which fringe these storms, the tornado being in this way constantly fed with rain and electricity as it progresses. On the approach of a tornado the temperature frequently falls 15° in 3 or 4 minutes. I traced the path of one for 120 miles along the Gulf of Guinea, which travelled that distance in 4 hours, and its course was W.S.W. true. This tornado I observed on shore at Accra, and by referring to the logs of the men-of-war which were at anchor off other places, I discovered its rate of progression.

Tornadoes are most violent and frequent in the neighbourhood of Sierra Leone, and also at the island of Fernando Po: they are most frequent at the commencement and close of the rainy season (June to Sept.), and are most violent at the former period; they do however occur occasionally throughout the dry season, but I have never seen one during the rainy season proper. They extend a long distance to seaward, in fact, all over the region of the S.W. monsoon, but diminish in frequency as the distance from land increases. During the rainy season (June to September), especially in the Gulf of Guinea, the S.W. monsoon (it then being at its greatest strength) frequently blows home to the coast, obliterating the sea and land breezes. On these occasions the weather is most oppressive, as the night temperature remains very high, the diurnal range being but 3° or 4°.—(*Journal of the Meteorological Society*, Vol. iv. p. 26.)

Between *Capes Mount* and *Mesurado*, as well as upon the coast westward, between Cape Mount and *Cape St. Anne*, the rains begin with May, and continue till October, accompanied with great thunder and lightning, and furious gusts of wind from the north-westward. During this time the sea sets so hard to the N.E. along the coast, and with mountainous billows, that it is impossible to approach the shore; so that ships which, between July and September, happen to fall below Cape Mount, cannot, without great difficulty, get about to the South.

(103.) On the GOLD COAST, between the rivers Assinee and Volta, the seasons are very nearly the same as on the Grain Coast. In January the wind begins to blow hard from the S.W. quarter, and becomes stronger in February, bringing with it sometimes rain, and sometimes a hurricane. About the end of March and beginning of April those heavy tempests, commonly called the tornadoes, arise, accompanied with a deluge of rain, thunder, lightning, and sometimes with earthquakes; these continue to the end of May, and are announced by the darkness of the sky in the S.E.

During the rainy season, that is in May and July, few or no land winds are felt; but, from the sea, it blows out of the S.W. and W.S.W., making a very great swell, which continues, even in August, though the rains begin to cease in that month.

The weather on the Gold Coast grows fair in September, and the air clear, with gentle South winds; and this continues till January, the hottest days being in December.*

To the southward of the Equator the rains on the coast begin to fall in October, and continue till January, but subject to the same variations as North of the Equator; the seasons being governed by the earth's place on the ecliptic.

A young officer, in describing the country near the River Bonny, speaks of the climate thus:—Here the sun acts not only upon the body, but upon the the mind, also, its influence is great; and none but those who have experienced it can imagine the pleasure of seeing the sun, after its burning course, sink into the cool bed of the ocean.

The burning rays of this part of Africa are possessed of so much power, that braving them in the day time may be considered as an act of insanity; for if a *coup de soleil* does not quickly deprive you of reason enough to know anything about it, you will soon discover that a second walk in the sunshine may save you the necessity of looking after your own affairs, and trouble your next of kin to take charge of your body and estate. All nature seems, in these caloric regions, to feel and look parched and feverish, and I firmly believe that every cat, dog, mouse, tree, shrub, and butterfly—in fact, every member of the animal and vegetable kingdom looks with as much pleasure upon the daily decrease of the hot luminary as they hail with delight the cool refreshing dews of night, with the cold comfortable-looking moon shining, with its round unmeaning face, upon the thirsty earth. An Englishman cannot understand a tropical sun; the dog-days of our temperate isle would be refreshing moments to the toasting, stewing, enervating hours of an African purgatory; frequently no breath of air sweeps over the waters to cool your parched skin, or else you inhale air that almost burns the lungs, so hot and arid is it. With night come the tempting, but too fatal dews, and a refreshing breeze.

"The morrow comes when they are not for thee."

(104.) At the ISLAND OF ST. THOMAS, which is situated nearly on the Equator, in long. 6½° E., the climate is materially different from that of the Gold Coast; and upon this part of the subject the following remarks of Capt. Sabine will be found interesting:—The occasional advance of the cold water of the *Equatorial Current* to the Island of St. Thomas may assist in explaining an apparent peculiarity in the climate of that island, when compared with the climate of the coast of Western Africa generally. At all the British possessions from the Gambia, in lat. 13° N., to the forts on the Gold Coast, June, July, and August, are accounted the unhealthy months; whilst at St. Thomas, on the contrary, they are the most healthy in the year to Europeans, although they are not so to the negroes, who suffer much from colds and rheumatism during their continuance. It has been shown that the water of the Equatorial Currents is from 10° to 12° colder than that of the Gulf of Guinea, and that its northern border, which, at other seasons, passes the meridian of St. Thomas at a distance of from 120 to 180 miles South of its southern extremity, was found in June in contact, or very nearly so, with the island itself; and it is not improbable, from the consideration of the causes which occasion its advance toward the Equator when the sun is in its northern signs, that in July it may extend so far as even to include the whole island of St. Thomas within its limits.

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* For a description of the Harmattan, or temporary easterly wind which at times prevails in December, January, and February, see the "North Atlantic Memoir," Fourteenth Edition, pages 225, 228; also a paper by Commander E. G. Bourke, R.N., in the Journal of the Meteorological Society, Vol. iv. p. 26.

The temperature of the air is known to be immediately dependent on that of the surface water of the sea, and to be influenced nearly to the full extent of any alteration that may take place therein. In crossing the Bight of Biafra, from Cape Formosa to St. Thomas, the air over the surface of the Guinea Current, observed in the shade and to windward, at sunrise, noon, and sunset, averaged 81½°, the extremes being 79° and 83½°; whilst in the passage from the River Gaboon to Ascension, over the Equatorial Current, the air averaged only 74°, the extremes being from 73½° to 74½°, a part of the passage being, moreover, on the very edge of the two currents, and within sight of St. Thomas. The vicinity of the Equatorial Current, therefore, when the sun is in the northern signs, cannot fail materially to influence the temperature of the island (particularly as the wind is always from the South), and thus to affect its climate. Situated on the Equator, St. Thomas has naturally two cold seasons, or winters, in the year, the sun being equally distant in June and in December; but in June, July, and August, is super-added the influence of the surface water of the ocean, several degrees colder than in November, December, and January, rendering the months of June, July, and August, pre-eminently the winter of St. Thomas, in which the natives complain of colds and rheumatism, and the health of Europeans is less affected than at other seasons, because the climate is then less dissimilar than usual to their own.

The comparative unhealthiness of Prince's Island to that of St. Thomas, and of both to Anno Bom, as the residence of Europeans, has been frequently and particularly noticed by Portuguese authorities, and is universally recognised at Prince's Island, and at St. Thomas. It may be a sufficient explanation to remark, that Anno Bom is always surrounded by the Equatorial Current; Prince's Island always by the Guinea Current; and that the position of St. Thomas is intermediate, and its climate is occasionally influenced by both. In tropical climates a very few degrees of temperature constitute an essential difference in the feelings of the natives, and in the health of Europeans.

(105.) From the circumstances above explained, vessels navigating on the Windward and Gold Coasts will, of course, be accelerated or retarded, according to the season. An able and competent judge of the subject has said, "*During the period of the year when land breezes alternate with those of the sea*, the best mode of beating a ship to windward is to get under way as soon as the wind blows steadily from the land, hugging the shore on board as near as may be prudent, for by that means every advantage is derived from it that can be expected. Soon after daylight this wind veers to the West, and lays the ship's head off shore; by 11 a.m. the sea breeze will have acquired its strength and true direction, at which time, also, the vessel will have made a good offing. Tack and stand in-shore. anchoring when in 8 fathoms of water, where it will be proper to wait for the land wind. By adopting this method, a vessel is placed in the best possible situation for taking early advantage of the breeze from the shore; whereas if she were kept under weigh during the night, the probability is that she would lose all the ground she had gained the preceding day, independently of being placed where the land breeze might not reach her.

"*During the rains*, when the sea breeze blows both in the day and night, and at a few leagues from the shore from very near the South point of the compass, stand off shore for twenty-four hours, when the wind will mostly be found to blow at S.S.W. or S. by W., and often at South; with the port tack on board the vessel will lie up West clean full, and the variation being nearly two points southerly, she will not only make good her course, but southing also.

"As the current at this season of the year sets strongly to the eastward, it will be prudent to allow 36 miles in twenty-four hours for its mean velocity; otherwise, in bearing up and making the land, the ship will be found to leeward of her port of destination. This is an error many have fallen into. Perhaps it would be better to allow even 48 miles, because it is easy to run a few leagues to leeward, should the vessel prove to windward of the place to which she is bound."

(106.) The SEASONS of the country forming the BIGHT OF BIAFRA have been described by Lieutenant Bold nearly as follow:—Although nature here is apparently in a ceaseless state of verdant vegetation, the seasons vary as sensibly as in more temperate regions, contributing to the decay of old and regeneration of new fruits and plants. The spring commences about November, and the hot months of summer continue until May, during which period the weather is clear and fine, but excessively hot, with occasional tornadoes. From the middle of June the rains gradually increase, and continue in all July and August, descending during the latter in torrents. This period may be considered as the winter, and during it the inhabitants are afflicted with colds, fluxes, fevers, &c. In September, October, and November, the country is entirely enveloped in exhalations, which the natives term the *Smokes*, and which are exceedingly injurious to the European constitution.

It is advisable for those who intend to remain for a season in the *River del Rey* to have a housing over the vessel, in order to preserve the health of the crew, as well as the ship's decks and sides, which would otherwise be materially damaged by exposure to the sun during so long a period.

(107.) *About the island of* ANNO BOM the wind blows with a moderate force, and little variation, from the South and S.W. quarter throughout the year; so that, as ships lie there, under shelter of the land, they ride at anchor exceedingly easy and safe, and the navigator has little or no danger to apprehend from wind and weather, excepting about the months of March and September, when tornadoes, or strong gusts of wind from the eastward, prevail at times over the general sea breeze, and blow direct into the anchorage; but, fortunately, the previous gloominess of the horizon to the eastward, and the heavy thunder and lightning by which they are preceded, always give timely notice to those who have not the ground-tackling requisite for riding them out to get under sail, and withstand their fury in the offing.

In point of salubrity to European visitants, this island could scarcely fail of proving superior to any of our settlements on the western coast of Africa, and it is much better suited to the constitution of Europeans than the climate of any other African island situated within the tropics, and at a shorter distance from the continent. It is situated far out of the reach of those pestilential vapours and excessively heavy dews and rains which are so prevalent and so fatal to Europeans, on the coast of the continent, and it does not contain any marshy land nor stagnant waters within its shores.

(108.) River Congo.—Lieutenant Bold has stated that the seasons, in the vicinity of Congo, are considerably later than those to the northward. *Massanga*, or the season of rains, commences in October, and terminates in January; then *Neasu*, or the harvest months, succeed, and continue until March or April. *Quitomba*, or the tornado season, takes place in May or June; and is followed by *Quibiso*, the dry season, which continues until September, when the river rises considerably.

The Winds from September to March are most commonly between the South and West, with a rapid current to the North; but from March to the dry season from the S.S.E., at which period the current frequently runs to the S.W. The sea breeze generally sets in toward noon; and it may be observed, that vessels bound along the coast to the southward should invariably beat to seaward, out of the strength of the current, excepting when it should be found weatherly, and at those hours the land winds prevail, which they may stand in-shore to take advantage of.

Commander E. G. Bourke, R.N., states that to the South of Cape Frio (lat. 18° S.) the wind is almost always from the South; in the southern summer it is very fresh, and extends as far as the Cape of Good Hope, being apparently a continuation of the strong S.E. winds there prevalent at that season; in the winter it is lighter, with occasional calms, and South of the tropics it is at that time interrupted by westerly gales, which increase in frequency and strength as the Cape of Good Hope is approached.

(109.) At the CAPE of GOOD HOPE.—The division of the year at the Cape may be said to consist of four parts, as in Europe; thus dividing it, the *Spring*, which commences at the beginning of September, and continues to the beginning of December, is indisputably the most agreeable season. The *Summer*, from December to March, is sultry, and would be intolerable, if the heat were not mitigated by the winds which blow from the Southern Ocean. The *Autumn*, from March to June, is distinguished by a variety of weather, though generally pleasant toward the end; and the *Winter*, from June to September, is usually cold, rainy, and stormy.

The seasons are also divided into dry and wet; the latter from September to March. The greatest heat is in January and February, when the thermometer sometimes rises to 100°. In the stormy or winter months, June, July, and August, it falls at times to 40°.

On the summit of the Table Mountain the temperature of the air is considerably lower in the clear weather of winter than in Cape Town; and in summer the difference is still greater, when the head of the mountain is enveloped in the fleecy cloud called the *Table Cloth*. The approach of winter is generally indicated by the subsidence of the winds and the disappearance of the cloud. These tokens are succeeded by heavy dews, thick fogs, and cold north-westerly winds, accompanied by violent storms of thunder, lightning, and rain. At the expiration of three days the atmosphere begins to brighten, and then the mountains on the continent appear with their summits covered with snow.

The climate of the Cape appears to be as healthy as any in the world, and no particular diseases belong to it. Here, as everywhere else, coughs are troublesome in the spring, and gout is common among the farmers, a circumstance easily accounted for. The people in general appear ruddy and healthy. In six months of the year 1829 the temperature of the air and sea-water was as follows:—In July, air 58°, water 57°; August, air 54°, water the same; September, air 60°, water, 56°; October, air 59°, water 55°; November, air 62°, water 57°; December, air 68°, water 58°.

The prevailing winds here are from S.E. and N.W. Others seldom last longer than a few hours. The East and N.E. are less than any. The North and N.W. commonly blow in hurricanes, and bring on foul weather. The S.E. winds blow, more or less, in almost all the months of the year, but chiefly in the fair weather season, from October to April; then you generally have, in the mornings, regular sea breezes from S.W. and West, which last till noon, and sometimes longer; they are followed by a S.E. and E.S.E. wind, coming off the land; this mostly blows fresh the remaining part of the day, and frequently all night, when the sea breeze comes off again. In the months of May, June, July, and August, the West and S.W. winds blow strong, being frequently accompanied with fogs and cloudy weather, but they are soon over. Sometimes violent N.W. winds prevail for several days together, and by fits in the other months; the sky at this time is constantly clouded, and they generally end in rain.

Mr. Webster, in his narrative of the voyage of the *Chanticleer*, has observed that, "On the eastern side of the Cape of Good Hope we find the sea breezes strong, and blowing home upon the coast; there the sea breeze coincides, in direction, with the trade wind. On approaching the southern line of the Cape, the tendency of the wind to blow from the S.E., or a cool quarter, still continues, as the causes remain the same; but on rounding the Cape to the westward the wind is found to veer gradually to the southward, and become S.W., because the S.E. is no longer the cool quarter to that part of the coast; and to some distance off shore, perhaps 100 miles or more, the S.E. trade cannot blow, for the cool quarter there is the S.W. Here the wind is light. But as we draw off shore, the S.E. wind begins to prevail, and in the open ocean is uninterrupted. On the western coast of Africa, generally within 100 or 200 miles from the coast, the cool air from the ocean rushes in, and counteracts the trade wind. It is, therefore, obvious that the western coasts of a continent within the tropics have different winds from the eastern. The eastern coast of South America has the S.E. winds blowing strong as far as Monte Video in the summer time; but the western coasts do not present the same extent of heated surface as those of Africa, on account of the chain of mountains which extend parallel to the coast, and in consequence there are not westerly but southerly winds on that coast."

(110.) Indications of Wind.—It has been stated that sometimes such swarms of flies are blown off the coast about the entrance of the Rio Plata, as to resemble a small dense cloud, which is invariably followed by one of the gales or hurricanes denominated *pamperos*, from blowing over the extensive Pampas or plains.

In the Eastern Seas swarms of large flies sometimes come on board vessels, and a typhoon is sure to follow. An eye witness said, "There were three Indiamen of us in company; typhoon flies flew on board our ship, the weather was very fine, and no appearance of a gale, and all of us were surprised when our old experienced captain immediately set us to work to send down royals, topgallant masts, &c., which we had scarcely accomplished, when a tremendous hurricane came on. We were obliged to keep the ship right before it for a long time. When it came on, our commander was on the forecastle, giving some orders, and the force of the wind was such, that he was unable to return to the quarter-deck for about four hours.

"The other ships suffered severely, losing topmasts, &c., but we escaped, owing to the experience of our captain, and his prudent measures, which commenced as soon as ever the flies were noticed."

Mr. Luccock says, "In the latitude of 34° South, and fully 200 miles from land, we found the rigging covered one morning with a multitude of small insects, some of them very beautiful. We had no doubt of their being brought from the land by a N.W. wind, which then began to blow fresh, but wondered at the distance to which they had been wafted. They were the precursors of one of the most durable gales which I ever experienced. It lasted ten days, with more or less violence, during which we drifted to 36½° South."—*Luccock's Brasil.*

(111.) On this subject Mr. Darwin says, "Several times when the ship has been some miles off the mouth of the Plata, and at other times when off the shores of Northern Patagonia, we have been surrounded by insects. One evening, when we were about 10 miles from the Bay of San Blas, vast numbers of butterflies, in bands or flocks of countless myriads, extended as far as the eye could range. Even by the aid of a glass it was not possible to see a space free from butterflies. The seamen cried out, 'It was snowing butterflies!' and such in fact was the appearance. More species than one were present, but the main part belonged to a kind very similar to, but not identical with, the common English *Colias edusa.* Some moths and hymenoptera accompanied the butterflies, and a fine Calosoma flew on board. Other instances are known of this beetle having been caught far out at sea; and this is the more remarkable, as the greater number of the Carabidæ seldom or never take wing. The day had been fine and calm, and the one previous to it equally so, with light variable airs. Hence we cannot suppose that the insects were blown off the land, but we must conclude that they voluntarily took flight. Before sunset a strong breeze sprang up from the North, and this must have been the cause of tens of thousands of the butterflies and other insects having perished. The most remarkable instance I ever knew of an insect being caught far from land, was that of a large grasshopper (*Acrydium*), which flew on board, when the *Beagle* was to windward of the Cape Verde Islands, and when the nearest point of land, not directly opposed to the trade wind, was Cape Blanco on the coast of Africa, 370 miles distant.

"On several occasions, when the vessel has been within the mouth of the Plata, the rigging has been coated with the web of the gossamer spider. One day (November 1st, 1832), I paid particular attention to the phenomenon. The weather had been fine and clear, and in the morning the air was full of patches of the flocculent web, as on an autumnal day in England. The ship was 60 miles distant from the land, in the direction of a steady though light breeze."*

4. Winds and Calms near the Tropic of Capricorn.

(112.) The S.E. trade wind is separated from the anti-trade winds by a belt the character of which is difficult to define. The analagous belt in the North Atlantic is sometimes called the "horse latitudes," from the bad weather encountered in it causing the necessity of throwing overboard horses which were being carried to the West Indies. This character will be hardly borne out by the term *calms* of Capricorn or Cancer, applied to them.

(113.) In the South Atlantic there is this important distinction in the amount of our knowledge respecting it,—that while, in the North Atlantic, it is traversed frequently by vessels throughout its whole extent, in the numerous passages made between the northern and southern ports of Europe and America and the West Indies, in the South Atlantic it is only well known on the two sides of the ocean, or those traversed on the outward and homeward passages around the Cape of Good Hope or Cape Horn. There is no immediate traffic across the South Atlantic. Our information as to the central position is therefore less complete, but also of less importance.

(114.) In a former page (33) is given the opinion of Captain Maury, that this belt is the line of junction of the upper but contrary currents which pass over the trade and anti-trade winds, and here descend to the surface and feed those winds by continuing their course as lower strata. This reasoning is borne out in some degree by the observations of Captain Toynbee, given on page 49, and some of its physical characteristics are there given.

(115.) From its nature, it can scarcely be termed a region of calms, and this is more especially the case on its eastern side. The breadth of the belt is much greater on the Brasilian side than on the African, for the S.E. trade wind in the South Atlantic seems to be analogous to those in the Indian and Pacific Oceans. It loses its force and regularity on the S.W. portion of its area. Thus, in the Indian Ocean there is a considerable space of baffling uncertain winds to the East and E.S.E. of Madagascar, and on the coast of Brasil, North of the Rio Plata, there seems to be a similar region, apparently under the influence of the land, which disturbs the normal current.

(116.) The question as to the mode in which the wind changes from the western anti-trade to the S.E. trade, is of some importance to be understood, inasmuch as a certain knowledge would enable us to say whether those gales which at times, and especially near the Cape of Good Hope, are of the character of the true cyclone, formed by opposing currents of air from contrary directions, or only those variations in direction as well as force which would naturally arise if the one passes directly into the other. As before stated, Capt. Toynbee's experience would lead to the inference that there are upper and opposing currents, which here contend for the mastery previous to assuming a new direction on the surface of the earth.

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* Voyages of the *Adventure* and *Beagle*, Vol. III, p. 185.

(117.) Such, too, is the argument in some measure held by M. Bridet, director of the observatory at the Island of Réunion, who has argued that the rotary gales or cyclones, which are believed to be encountered as far as lat. 35° to 40° S., are derived from those true cyclones which commence in the northern margin of the trade wind. These describe, at a great elevation in the atmosphere, the first branch of their parabola; and descending to the surface of the globe between 30° and 35° S. towards the southern limit of the trade wind, the second branch of this parabola. These cyclones turn from left to right, like all others in the southern hemisphere, but with an angular velocity less than that of cyclones of the torrid zone. Their centre, however, has a greater rate of translation than the cyclones of the torrid zone, and their path is directed from W.N.W. to E.S.E. or thereabout in the neighbourhood of the Cape of Good Hope, and between the parallels of 35° and 40°, having on their left hand, or North side, the dangerous semicircle, and the right or South side of the cyclone that which has moderate winds.

(118.) This question has been more fully gone into in our Directory for the Indian Ocean, pages 4—9. It is more important in that ocean, as ships have to make their passages across it in a higher latitude, and much more in an easterly and westerly direction than is done to the West of the Cape of Good Hope. In this passage it is of importance to keep on that edge of the cyclone which affords a favourable wind, and in sailing eastward this may perhaps be found on the parallel of 39°, and not more southward, as was experienced by Capt. Erskine in H.M.S. *Havannah.*

(119.) During the southern summer the S.E. trade extends as far South as the Cape of Good Hope, or during the period from September to April the predominant wind is from the S.E., especially so in January, February, and March, and the limit on this coast, which is of course very important to the navigation around, varies with the progress of the sun, as the N.W. and westerly winds of this intervening belt of the tropic of Capricorn commence in April, and in May hard gales occur between N.W. and S.W. They are strongest in June, July, and August, raising a very heavy sea. These prevalent westerly winds (the anti-trades) last till October, and are experienced for 100 miles off the coast. They bring rain, with thunder and lightning.

(120.) One important remark is, that the barometer *rises* with southerly winds, and *falls* with those from the northward. The gales most to be dreaded are those which are preceded by heavy black clouds, rising from the N.W. and West, sometimes with lightning. The old Dutch commanders were directed by the East India Company to wear and shorten sail when this occurred, as a heavy gale was expected from that quarter. When the wind at S.E. or E.S.E. shifted to N.E., they were directed to take in the mainsail. These hard gales are to be guarded against, especially in the winter, between the Cape Bank and the South end of Madagascar.

(121.) During the southern winter, the great westerly aerial current reaches the southern point of the African continent, and attains its greatest force, on account of the obstacle that the land presents. It divides near the Cape into two branches; the one turning to the left blows up the western coast of Africa: the other turns to the right, and follows the southern coast to the East of Agulhas.

(122.) By supposing this current blowing from the W.S.W. to E.N.E., and the line of division being some distance to the North of the Cape, it will explain how that strong N.W. winds will occur in Table Bay, and at the same time that a fresh breeze from the S.E. is blowing at only 180 miles to the N.W. of the Cape. The oscillations of this parting line will also explain the sudden shifts of winds encountered in its neighbourhood.

(123.) The varying winds, then, in the neighbourhood of the Cape of Good Hope, will be a good guide as to the southern limit of the trade wind, and of the position of the belt separating it from the anti-trades, which vibrates with the progress of the sun about its latitude. But it by no means follows that the space in question should be occupied by variable or light winds, for it has been argued and demonstrated, that at times the westerly winds gradually assume a S.W., then South, and at last a S.E. direction, without much diminution of force. And this is especially the case near the Cape, for it is frequently found that on gaining a good offing to the westward, the steady S.E. wind is encountered and may be carried up to the line on the usual homeward route.

(124.) On the American side this belt of uncertain winds is broader, and its limits are more variable than on the eastern side of the South Atlantic, It is in this respect analogous to what has been observed in the Indian Ocean, as before mentioned. In January and February, when it is at its northernmost point, it may be encountered when near Trinidad and the Abrolhos, lat. 20°, and if going round the Horn, the true westerly anti-trades may not be met with till in lat. 35°. In August these limits may be respectively 15° and 30°. But, as has been said before, the land influences are very powerful here, and therefore the remarks on the winds on the Brasilian coast must be considered to relate to what occurs more or less in the open ocean. Further than this the illustration must give the required information. Of course, the lines there given as defining the boundaries of the calm and wind regions are necessarily very vague, in many cases derived from very insufficient data, and in reality fix a limit to what cannot be bounded except by opinion.

(125.) River Plata.—This portion of the American coast is within the limits of this changing belt of winds, and therefore the ensuiug remarks are applicable to this section. The climate of Monte Video is temperate, but fluctuating and tempestuous. It is much healthier than that of Buenos Ayres, and totally free from those marsh fevers which are common at the latter place, in consequence of its situation up the river. In winter slight frosts are sometimes observed, but no snow has been known to fall at Monte Video. The mean temperature of the water is about 55°; that of the river water at the time being the same. The weather, during spring, is very variable and liable to storms. In the summer and autumn it is sultry and oppressive, especially during the long calms which take place; but in the middle of the day there is generally an agreeable breeze from the S.E. Northerly winds are accompanied by rain, and a S.E. wind is frequently so; but the wind from the S.W. is most free from it. Violent gales are common at all seasons of the year, attended frequently with thunder-storms; but these are most severe during summer and autumn. Sometimes the thunder-storms are accompanied by hailstones of a considerable size, which not only break windows, but kill poultry; they often terminate in a *pampero*, the well-known hurricane of the country. It is said that, in a pampero, sand and small gravel have been blown on board the ships in the roads, a distance of 7 or 8 miles from shore.

(126.) Mr. Webster has described the indications of a pampero, from his own observations, as follows:—The weather is sultry during a few days, with a light breeze from the East or N.E., ending in a calm. A cool light wind then sets in from the South or S.E., but confined entirely to the lower strata of the atmosphere, while the clouds above it are moving in the opposite direction from N.W. to S.E. The northern horizon, as night advances, becomes dark with heavy lowering clouds, accompanied with lightning from the East or N.E. The southern wind now ceases, and is followed by variable winds from the northward. Heavy clouds are thus brought over; and lightning, accompanied by thunder, follows in a most terrific manner. The wind veers gradually to the westward in violent gusts, the lightning becomes more vivid, and the thunder more awful; a gale of wind follows from the S.W. more violent, but of short duration, and fine weather ensues.

These pamperos are very destructive to shipping, and frequently occasion wrecks and the loss of boats. The lightning is beautifully coloured, presenting the hues of orange, violet, and pink. Mr. Webster adds, "I have also witnessed at Monte Video very remarkable instances of electric light, playing like the *aurora borealis*, at an altitude of 20° above the horizon. One evening, October 4th, I observed an arc of light which remained permanent, with a tremulous motion, for the space of twenty minutes; a strong gale of wind was blowing at the time; it was of a pale yellow colour, and flashes of lightning frequently appeared beneath it. Meteors or falling stars are very rare, and earthquakes are scarcely known here."

(127.) During a visit to the River Plata by Capt. King, in the *Adventure*, a pampero of unusual violence occurred. "On the 30th January, 1829, after some intensely hot and sultry weather, we experienced a severe pampero. It was preceded by the barometer falling to 29·50, and by a strong N.W. wind, which suddenly veered round to S.W., when the pampero burst upon us. Our ship and boats fortunately escaped any bad effects from the violence of the squall, which was so strong as to lay the former, at anchor, upon her broadside. The spray was carried up by whirlwinds, threatening complete destruction to everything that opposed them. In less than half an hour it had diminished to a strong S.W. gale, which lasted during the night." "On the night of the 2nd of February we experienced another very severe pampero, during which one of the *Beagle's* boats, hauled upon shore, was blown to atoms. The barometer had previously fallen to 29·39."*

(128.) Capt. Heywood gives the following remarks concerning the winds, weather, &c., in the River Plata:—At the entrance of the River Plata the prevailing winds during the summer months, from September to March, are north-easterly, with tolerably clear weather overhead, but a dense atmosphere near the horizon. These winds haul gradually to the eastward as you advance up the river; and at about the full and change of the moon strong breezes from the south-eastward are common at this season, accompanied with rain and foul weather. At Buenos Ayres, during the summer months, the S.E. winds are generally fresh in the daytime, hauling round to the northward in the night.

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* Narrative, &c., Vol. I, p. 189.

During the winter months, from March to September, the prevailing winds, at the entrance of the Plata, are S.W., or more westerly; but up the river, more generally from the northward than the southward of West.

The winter season is the best, in point of weather, in Buenos Ayres; for the winds being chiefly from N.W. to S.W., the water is smooth, and the communication can be kept up between the shore and the shipping with more facility. The weather is sometimes, but not frequently, foggy. Fogs are most common in the months of July, August, and September, and prevail more at the entrance of the river, as far up as the S.E. tail of the Ortiz, than above the banks.

PECULIARITIES OF WIND, TIDES, AND CURRENTS.—The River Plata has many singularities, which I think may, in a great measure, be accounted for, from its formation being so different from any other known river. Its entrance being very wide and very shallow, it is affected by every change of wind in a most extraordinary manner; so much so, that a shift of wind may be predicted almost to a certainty, by observing carefully the state of the mercury in a barometer and the set of the currents, which usually shift before the wind. In *calm* weather the currents are generally very slack; and then as regular almost as tides, setting up and down the river alternately. When the winds are variable, the currents are equally so; and I have known the *Nereus* to be current-rode four different ways in less than 6 hours. When the current comes in from the eastward, along the North bank of the Plata, a north-easterly wind may generally be expected to follow; and at the same time (should the wind have been previously to the S.E.) the mercury in the barometer will fall a *little;* but much more if the transition be quick from S.W. without stopping in the south-eastern quarter.

When the wind continues in the N.E. quarter, the mercury is more depressed (according to its strength) than with any other wind; and there is usually, *then*, a set *into* the river on the North bank, and *out* on the *opposite*. Indeed, whilst the winds are between N.E. and S.S.E., the current generally runs to the westward past Monte Video, though without much augmenting the depth of water off that place, but filling the river above the banks.

The winds between N.N.E. and W.N.W. make the water lowest, the outset being then strongest along the South bank of the river, past the Points Del Indio and Memoria, but very inconsiderable along the North bank.

Before the setting in of a S.W. gale or pampero, the weather is usually very unsettled, and the winds unsteady and variable in the northern and north-western boards, preceded by a considerable fall in the mercury, though it usually rises a little again before the wind shifts to the S.W., and often continues to rise, even though the wind may increase from that quarter.

Before these winds set in at Buenos Ayres, the current runs up and fills the river unusually high; at the same time as strong an outset is experienced along the North bank, which continues whilst the winds are strongest from W.S.W. to South, seeming to prove that these winds force up, from the southward, a large accumulated body of water past Cape St. Antonio, which can only find a passage out again by the North shore, where they increase the depth of the water, as well as up the river, and particularly in the shallow harbour of Monte Video. Whilst these S.W. winds blow the air is cold, and the atmosphere clear and elastic, in a degree rarely to be met with in any other part of the world. They are generally succeeded by some days of fine, serene weather, the wind continuing moderate from the southward, or varying to the eastward.

I have never known the velocity of the tide or current, in the River Plata, anywhere to exceed 3 knots per hour; but I have heard it said by some that they have found it run at the rate of 6 or 7 miles an hour!

As the winds outside the River Plata, and particularly about Cape St. Mary, are most frequently from the north-eastward and northward, except when the S.E. summer and S.W. winter gales blow, about the times of new and full moon, I consider it, on the whole, most advisable for ships bound into the river to get in with the land about the latitude of that cape, which is 34° 40′ S., and its longitude 2° 9′ E. of Monte Video.

(129.) The following remarks on the winds of the River Plata are by the late Capt. R. von Bronikowski, 1865:—

The winds to be dreaded by sailing ships, and guarded against in the river, as well as in approaching the same, are the winds from the western quarters; and I would advise shipmasters, when bound to the Plata, to keep a strict eye more on the state of the weather and appearance of the sky than on the state of the mercury in the barometer. Not to say that the barometer should not be consulted, far from it; but to take it as an infallible guide, I certainly do object. The great depression of the mercury before the setting in of a pampero, and the sudden rise when the gale veers to the West and S.W., do not always take place. I have experienced several instances where the mercury kept quite stationary during the successive changes of wind from N.E. to North, N.W., and S.W., and even to S.E. But before these visitants burst upon the ship, they gave ample warning. The air, before the setting in of one of these thunder-storms, although close and sultry, is often clear to such a degree as to dazzle the eye. Objects are seen at a great distance, and seem to advance towards the spectator. Heavy masses of clouds rise in the N.W. quarter, with distant thunder and lightning. These masses of vapour rise quickly, and assume a most appalling aspect. The incessant flashes of beautiful pink-coloured lightning interlace one another like a hundred fiery serpents, while the deafening roar of thunder is most terrific. Fierce gusts of wind follow one another in quick succession, and while the rain pours down in torrents, the wind veers to the S.W., South, and often S.E. The weather then soon begius to clear up, and a gale from the southern quarters, but often only a moderate wind, and fine weather follows.

Vessels running down the coast between Rio Grande and the Plata with a N.E. wind, should pay particular attention to the state of the weather. A dense, close atmosphere, and gloomy weather, are sure forerunners of much wind from the western quarters, accompanied by terrific thunder and lightning.

I may remark here that the approach of the 1st of September, the feast of Santa Rosa, is looked for in the River Plata with a good deal of anxiety, and still more superstition, by all classes interested in the shipping, and it has become a popular notion, even amongst the better informed, that that day is doomed to be a day of shipwreck and disaster throughout the boundaries of the Plata. These gales are easily accounted for. The feast of Santa Rosa is near the equinox, and these destructive gales therefore are the equinoctial gales of the southern hemisphere. Vessels going up or down the river between Point del Indio and Buenos Ayres, should keep an eye open to the S.W. The squalls coming off the South shore, properly called pamperos, are very fierce, and give but short notice. Sudden changes occur from a moderate breeze and clear weather to a whole gale of wind in less than a quarter of an hour.

(130.) W. B. Tripp, Esq., C.E., makes the following remarks on the meteorology of Buenos Ayres, based upon observations taken during portions of the years 1874, 1875, and 1877.

The prevailing wind during summer is from the N.E. and North, and during the winter from N.W. and S.W., the N.E. being the wind of fine, though warm and oppressive weather, and the S.W. the healthy, cold, and stormy wind.

When the wind settles well in the N.E., it generally continues in that quarter till a storm comes, and is always accompanied by a falling barometer. The S.W. wind comes as a storm from across the Pampas, and is consequently known as the "Pampero." It causes the barometer to rise rapidly, and is usually preceded by the wind veering with the sun through North and N.W., but sometimes the wind backs round by East and S.E., and a gale from this point is the most disastrous for the port of Buenos Ayres, as it drives many craft ashore, on the top of extraordinarily high tides, propelled by the S.E. wind. The wind having settled in the N.E., the temperature gradually rises as the barometer falls, the air becomes extremely humid and oppressive, clouds gather in the West and S.W., and lightning is seen to proceed from them as the evening approaches. This is a sure sign of a Pampero, which is preceded by a dust storm; and if it is accompanied by rain, the first drops consist of diluted mud, while a violent thunderstorm is usually experienced. The wind sweeps across the Pampas with great force, and causes a complete change in the condition of the air, the barometer rising and the temperature falling suddenly, after which the wind again settles in the N.E., and the changes proceed as before. Such a storm may last for a few hours, or for six or seven days, the longest duration being commonly about three days. Storms are generally most severe between the end of July and the end of September.

During the warmer months a sea breeze, called the "Viraro," blows almost daily in the afternoon and evening from the S.E. and East, though the breeze occasionally is felt from the colder land regions towards the S.W. This breeze may be observed as early in the spring as August.—*Journal of the Meteorological Society*, vol. v., p. 149.

5. The Anti Trades or Passage Winds.

(131.) This region of the "brave West winds," as they are termed by Capt. Maury, encircles the earth to the southward of the tropical calms and variables, as far southward as is practicable for navigation. It varies very irregularly between N.W. and S.W., with a mean direction, probably, of about West, and this is found in the line of its greatest strength, or about the parallel of 45° S., shifting with the progress of the seasons.

(132.) It is this West wind which, in the southern winter, is such an obstacle to making way around Cape Horn, which protrudes so far into its influence, on the one side, and from the Indian to the Atlantic Ocean around the Cape of Good Hope on the other. In the former case we shall give such observations and instructions as are necessary hereafter. For leaving the Indian Ocean by this route, the reader is referred to our Directory for the Indian Ocean, where the subject is fully discussed.

(133.) As to the intermediate space between the two capes of the Atlantic Ocean, it is almost unknown; and Capt. Maury says, that amid the thousands of logs which he has examined and discussed, only two of them record passages from one cape to the other. Therefore the phenomena of this mid-ocean tract is comparatively unimportant to navigation. The illustrative diagrams on the wind charts must serve to show the prevalence and direction in each space, as far as is known.

(134.) Barometer.—The value of this instrument as an indication of wind in high southern latitudes has been the subject of much controversy. By many it has been considered as useless, but, as will be seen, this opinion is based on a comparison with its indications in the northern hemisphere. The mean of all observations of the height of the barometer between the parallels of 55° and 60° *North* latitude is 29·85 inches, while in the same latitude in the South it is only 29·24 inches, a difference of six-tenths,—so low, that its fine weather monition in the South would be taken for a forerunner of a gale in the North. The mean height of the barometer for the year, at Greenwich, is 29.956 inches, as reduced to the sea level.

(135.) The low barometer, especially in the Austral winter off Cape Horn, and in high South latitudes, had been the subject of universal remark, and this anomaly led the late Admiral FitzRoy to institute an inquiry into the actual condition of the atmosphere by a wide comparison of the observations made. The results were not attained until after his death, and their main features are here given, as published by the Meteorological Department.

(136.) It has long been a well-known fact that the average height of the barometer diminishes from the juxta-tropical zone towards the arctic, and the importance of obtaining normal barometric heights for different parallels of latitude, pointed out long ago by the Royal Society, has since been insisted on by many eminent meteorologists, more especially by the distinguished chief of the Meteorological Institute of Utrecht; but until the publication, in 1861, of Captain Maury's results, it was not supposed that the diminution of average barometric pressure in high southern latitudes was so rapid or so uniform as it then appeared.

From nearly 7,000 observations of the barometer South of the parallel of 40°, Maury obtained the following average heights :—

	Inches.
Between 40° and 43° S., from 1,703 observations, barometer	= 29·88
Between 43° and 45° S., from 1,130 observations, barometer	= 29·78
Between 45° and 48° S., from 1,174 observations, barometer	= 29·63
Between 48° and 50° S., from 672 observations, barometer	= 29·62
Between 50° and 53° S., from 665 observations, barometer	= 29·48
Between 53° and 55° S., from 475 observations, barometer	= 29·36
In 56½°, from 1,126 observations, barometer	= 29·29

To the southward of 56° 30′, Capt. Maury appears to have had no observations, but he assumes that the average barometric pressure diminishes in higher latitudes in the same proportion, and concludes that at the South pole it is as low as about 28·14.

The low average height of the barometer in high southern latitudes was noticed by Sir J. C. Ross during his Antarctic expedition, and the low barometric pressure in the neighbourhood of Cape Horn has frequently been remarked. Captain Maury's observations indicate an average diminution of pressure between 40° S. and 60° S. of about two-tenths of an inch for every five degrees of latitude. His observations were, however, comparatively few (not quite 7,000), while the area embraced was large, and to ascertain the nature of his conclusions the inquiry was instituted, of which the results are given presently.

A very large number of reliable observations, available for the purpose, existing in the Meteorological Registers received by the Board of Trade, it was determined, after much consideration, to proceed in the following manner.

The first portion of the inquiry included over one hundred thousand observations, made on about eleven thousand days. Four groupings, or collections, were made for each month and for successive zones of five degrees between 40° S. and 60° S., showing, first, the number of days on which the barometer was *high* (that is, on which the *average* height was above 30 inches), and the mean of these readings; secondly, the number of days on which the mean reading of the barometer was between 30 inches and 29·5 inches, and the mean of these readings; thirdly, the number of days of observation and mean barometric readings between 29·4 inches and 29 inches; fourthly, the number of days of observation and mean of barometric readings below 29 inches.

The first of these groups or collections was called *High*, the second *Upper mean*, the third *Lower mean*, and the fourth *Low*.

A fifth collection for each month was then made of the number of days of observation and mean of *all* barometric readings for each zone of 5° of latitude.

Tables showing the Mean Heights of the Barometer during each Month of the Year, for each 5° of Latitude, between the Parallels of 40° and 60° South Latitude.

	40° to 45°						45° to 50°					
	a	*b*	*c*	*d*	*e*		*a*	*b*	*c*	*d*	*e*	
	Bar.	Bar.	Bar.	Bar.	Days.	Bar.	Bar.	Bar.	Bar.	Bar.	Days	Bar.
Jan.	30·21	29·75	29.36	—	287	29·99	30·22	29·70	29·30	28·88	238	29·69
Feb.	·22	·76	·31	28·70	349	30·06	·20	·70	·33	·85	215	·85
March....	·24	·78	·33	·83	333	29·99	·19	·71	·30	·87	246	·74
April	·22	·75	·33	—	328	30·04	·20	·75	·32	·85	209	·76
May	·22	·74	·27	·79	332	29·87	·22	·70	·28	·81	219	·72
June	·21	·72	·30	·80	381	·85	·27	·69	·30	·68	186	·65
July	·24	·76	·35	·60	368	·99	·24	·74	·24	·90	125	·82
August ..	·27	·74	·28	·90	424	·98	·19	·74	·33	·85	125	·83
Sept.	·25	·75	·30	·78	402	·96	·22	·73	·30	·79	225	·77
October ..	·26	·75	·27	—	401	30·02	·20	·72	·30	·83	200	·77
Nov.	·23	·74	·28	.90	380	29·94	·19	·72	·30	·81	306	·70
Dec......	·21	·77	·30	—	371	·98	·16	·70	·29	·86	314	·67
Total Days of Observation and Means.					4356	29·97					2608	29·74

	50° to 55°						55° to 60°					
	a	*b*	*c*	*d*	*e*		*a*	*b*	*c*	*d*	*e*	
	Bar.	Bar.	Bar.	Bar.	Days.	Bar.	Bar.	Bar.	Bar.	Bar.	Days.	Bar.
Jan.......	30·11	29·67	29·28	28·77	252	29·41	30·20	29·66	29·24	28·76	217	29·25
Feb.......	·14	·66	·29	·78	211	·44	·15	·62	·29	·80	236	·23
March ..	·22	·70	·27	·86	207	·57	·21	·66	·21	·75	163	·25
April	·17	·68	·27	·71	166	·44	·12	·70	·20	·68	149	·20
May	·28	·66	·26	·72	205	·41	·18	·67	·24	·73	111	·39
June	27	·65	·24	·82	158	·48	·18	·61	·24	·74	123	·28
July	·24	·73	·25	·74	165	·53	·15	·76	·25	·77	69	·54
August ..	·22	·66	·28	·84	182	·56	—	·64	·24	·68	69	·28
Sept.	·21	·67	·28	·77	140	·51	·12	·63	·22	·67	124	·29
October ..	·15	·69	·27	·77	161	·48	·13	·61	·23	·75	120	·10
Nov.	·12	·63	·24	·69	214	·31	—	·60	·24	·74	123	·11
Dec.	·11	·65	·24	·75	270	·43	·10	·67	·21	·78	180	·21
Total Days of Observation and Means.					2331	29·46					1674	29·24

The figures in columns *a*, *b*, *c*, *d*, *e*, show—

a Mean of Barometer Readings *above* 30 *in.*

b Mean of Barometer Readings *between* 30 *in. and* 29·5 *in. inclusive.*

c Mean of Barometer Readings *between* 29·4 *in. and* 29 *in. inclusive.*

d Mean of Barometer Readings *below* 29 *in.*

e Number of Days of Observation and Mean of *all* Barometer Readings for each 5° of Latitude.

(137.) The following are the general results of the whole inquiry, between the parallels of 40° S. and 60° S.

Of 5,248 *days* examined, between 40° and 45° S., the mean height of the barometer was above 30 inches on 2,679 days, more than half the whole number; between 30 inches and 29·5 inches on 2,133 days; below 29·5 inches but above 29 inches, on 392 days; and below 29 inches on only 44 days.

Between 45° and 50° S., out of 2,980 days examined, the days of *High* barometer were 843; of *Upper mean*, 1,446; of *Lower mean*, 573; and the days on which the mean height was below 29 inches, or *Low*, were 118.

Farther southward, the proportion of days of *Low* barometer increases rapidly; between 50° and 55° the barometer was *Low* on 350 days out of 2,987; the days of *Lower mean* being 1,071; of *Upper mean*, 1,265; and of *High* barometer, only 301.

Between 55° and 60° S. the observations of 1,953 days have been examined. Of these, the days of *High* barometer were only 88; of *Upper mean*, 526; of *Lower mean*, 775; and the days of *Low* barometer, that is, the days on which the average pressure was below 29 inches, were as many as 564, or between one-fourth and one-third of the whole number.

The approximate mean height of the barometer, for each zone of five degrees, obtained from about 115,000 observations made on 13,168 days, is 29·97 between 40° and 45°; 29·74 between 45° and 50°; 29·46 between 50° and 55°; and 29·24 between 55° and 60°.

Maury's heights for the same parallels are respectively nearly 29·83, 29·63, 29·43, and 29·29. The observations used by him did not amount to quite 7,000, and he observes that the instruments from which they were obtained "were for the most part the old-fashioned marine barometer to which no corrections have been applied." Still his results show considerable general agreement with the results obtained here from more than sixteen times as many observations made chiefly with compared and reliable instruments having insignificant errors.

(138.) In *mid-ocean*, as before alluded to, our knowledge is but very scant. It will be seen that the line dividing the separate wind systems has a curve to the northward during some periods of the year, and does not follow the same parallel of latitude between the two continents. By referring to the chart of the currents and the ice-drifts, hereafter given, it will be seen that there is a great inset of cold water from the S.W., around Cape Horn, which passes with great strength and persistence far to the N.E. of the extremity of South America, and also, during a large portion of the year, bears a great quantity of ice into low latitudes. There is something analogous in the Arctic and Labrador Current over the Newfoundland Banks. Whether this has any bearing on this want of symmetry in the wind zones, which might be reasonably argued, must be determined by closer inquiry than has as yet been brought to bear on it. But in crossing this tract, should any unexpected change of wind or weather be encountered, it might direct attention to this point.

(139.) Of the WINDS and WEATHER off the *Patagonian Coast*, between *Cape Blanco* and the *Virgin's Cape*, Capt. King says, "Our experience of the wind and weather upon this coast was not sufficient to enable us to form any judgment of the changes that are liable to occur. The prevailing winds, particularly towards the southern portion, are from the S.W., from which quarter the gales are the strongest; but near the land, during the summer season, they veer about between South and W.N.W.; and in the winter, when the sun has northern declination, they hang more commonly to the northward of West. Northerly winds are accompanied by misty or foggy weather, particularly on that portion of the coast between the Rio de la Plata and Port Sta. Elena.

The marine barometer here is of signal advantage. It is low with a northerly wind, but so soon as the column has fallen to 29 inches, or lower, and ceases to fall, a change of wind from the S.W. may be expected; which commences with, or very soon follows, the ascent of the mercury; the wind then freshens and blows hard, and the weather clears up. The clouds are white, of large size, and rounded form, and the air becomes elastic, dry, and cold. During the existence of, and for some days preceding, a northerly wind, there is generally a very copious deposition of dew; indeed, the appearance of it is an infallible presage of the change. With northerly winds the air is mild and excessively damp, but when they blow from the opposite quarter it is cold and dry. The wind rarely blows from East, but sometimes obliquely toward the coast from N.E. or S.S.E.—(*Directions for the Coast of Patagonia*, by Capt. P. P. King, R.N., p. 17.)

(140.) STATEN ISLAND.—The climate of Staten Island is remarkably humid; and very few days can be passed there, in the course of the year, without rain; and it is rather remarkable that, however fine the weather may have been in the course of the day, some rain generally falls at night. Rain, however, is frequent there in all seasons of the year, and the sky is generally overcast. Thunder and lightning are scarcely known. The temperature may be considered as equally low, and varying little throughout the year. Frost is not very severe, nor very common in winter, and the snow does not lie long on the low grounds. The weather during summer is cool, but still humid; and, as a general characteristic, may be considered boisterous, unsettled, wet, and dull. Vegetation lingers slowly in its summer's bloom, and is not nipped by the severity of the winter's frost.

On shore the weather was a few degrees warmer than on board; and at night it was cooler. The most retired harbours of the island are not frozen. The wind is generally from the westward nine days out of ten, ranging from S.S.W. to N.N.W. Gales from the S.W. prevail during the summer, and from the N.W. in winter. Easterly winds are most prevalent in the winter months.*

(141.) TIERRA DEL FUEGO.—In the winters of Cape Horn and its vicinity, wind, accompanied with rain, sleet, snow, or hail, is the prevailing characteristic. The humidity is excessive; for, besides that arising from the vast expanse of ocean by which it is surrounded, rain, more or less, falls every night. The rain is so violent and incessant, that one might suppose the waters of the firmament were again falling in the shape of a second deluge. The gullies between the hills become so many courses for torrents of water, and the continuance of the rain at times is so protracted that a temporary gleam of sunshine is cheering to behold.

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* Voyage of the *Chanticleer*, Vol. I., pp. 129, 130.

South-westerly gales, attended on the onset with thunder and lightning, are exceedingly violent about the Cape, and are accompanied by the most terrific squalls, which may be almost considered as hurricanes. They rush down the ravines in the hills with most awful violence, threatening destruction to all before them, carrying the sea up in spray to the height of some hundred feet. The N.W. gales are not generally considered so heavy as those from the S.W. quarter; they are always accompanied by rain, but, nevertheless, blow with great force, and frequently veer round to the S.W. without abating their fury. The wind again will commence in the N.W., and be rapidly succeeded by a gale from some other point of the western quarter, most generally the S.W.

Easterly winds are reported to be most prevalent in the winter months of June and July, but they seldom blow with much strength, nor are they of long duration. It may be generally expected that they will be succeeded by a westerly gale. The weather accompanying them is mild and fine, but there are very few days in a month of fine tranquil weather. A gentle breeze from the N.W. is sometimes attended with fine weather. None of the little bays or harbours hereabout are ever frozen up, nor are those of Staten Island.

All circumstances prove that the southern regions of the globe are milder than the northern in equal latitudes. The Fuegian Indians are perfectly naked; they care for no dress, and seldom use it. Where such is the case the cold cannot be very severe.

The fact appears to be, that a low mean temperature prevails throughout the year in the Southern Seas; at Cape Horn the sun produces but little effect in the summer, and there is no intensity of heat for a few months as in the northern regions, owing, apparently, to the disproportionate expanse of ocean to that of land. The climate of the Falkland Islands corroborates this assertion. There it is mild, the thermometer being seldom so low as 32°, generally ranging about 50°. Snow never lies there for twenty-four hours, excepting on high land; the harbours are never frozen up, and the crews of vessels go barefooted with impunity.

In consequence of the equability of temperature in the climate of Cape Horn, produced by the immense expanse of ocean, the summer is much cooler than in the same parallel of the northern hemisphere; for there is no terrestrial radiation, nothing, as it were, to catch the sun's rays, which fall almost powerless on a wide extensive sea; but the winter compensates for this deficiency, and a remarkable degree of mildness prevails; for as the sea preserves nearly a uniform mild temperature throughout the year, above 44°, the air over it can never remain much below it for any great length of time.

Hail is frequent at a temperature from 42° to 48°. The nights at Cape Horn when clear are remarkably so—this arising, no doubt, from the humidity of the atmosphere, which increases its transparency. The cloudy nights prevent any radiation; and as the sun seems to act a subordinate part in this climate, there is a perfect equality of temperature throughout the 24 hours.

With severe S.W. gales the barometer falls, and very considerably, and the finest weather has been found with the lowest state of the barometer. A gentle N.W. breeze has been attended with very fine weather, and the barometer below 29°. The height of the mercury is perpetually fluctuating, showing a constant change in the aerial column.[*]

The heaviest and most lasting gale, says Capt. Weddell, that blows in the neighbourhood of Cape Horn, is from South, occasionally shifting a point or two each way. This gale I have frequently known to come on in a squall, and continue, in the tempestuous months, to blow from thirty-five to forty hours together. The southern horizon, filled with rising clouds, heavy and white, in a blue sky, is a sure indication of a lasting gale, with snow squalls. A complete calm commonly follows this wind, which, however, is not very frequent. The wind at East invariably rises light, and generally increases to a strong breeze; but when it veers from East to S.E., a strong gale may generally be expected, with snow or rain squalls.

A North gale also comes on gradually, and towards the end, which is generally in about thirty hours, it draws from the N.W. and brings rain, and presently shifts to the S.W., without ceasing to blow, and continues from that point twelve or fifteen hours. All gales are of shorter duration in summer than in winter; and it may be remarked, that a vessel may anchor anywhere for shelter from a S.W. wind without the fear of its shifting to the northward; but the contrary must be guarded against as the wind shifts from N.W. to S.W., continuing to blow with great violence.

In the most windy months N.W. gales blow with great force, when they rise rapidly near that point, and generally last twelve or fourteen hours. To the S.W. of Cape Horn they blow with less violence, but are more durable. In the summer season the winds between S.W. and N.W. frequently blow in gusts of six or eight hours' continuance, at the strength of a brisk gale; it then becomes moderate, and the wind inclines to the northward.

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[*] Voyage of the *Chanticleer*, Vol. I., pp. 193, 202. In pages 88—90 are given the recent determinations as to the mean height and indications of the barometer in high southern latitudes, and its great depression compared with northern. Captain King said (when surveying the coast):—" With respect to the utility of the barometer, as an indicator of the weather that is experienced off Cape Horn, I do not think it can be considered so unfailing a guide as it is in the lower or middle latitudes. Captain FitzRoy, however, has a better opinion of the indications shown by this valuable instrument; my opinion is, that although the rise or fall at times precedes the change, yet it more frequently accompanies it."—*Narrative of the Voyages of the Adventure and Beagle*, Vol. I., p. 465. And that fine weather may occur when the barometer is very low, as above stated, the following extract from the same work will demonstrate:—" April 2nd, 1830 (near Cape Horn), the glass had been falling so much, and was then so extremely low, that I thought it prudent to prepare for the worst, and struck topmasts. Notwithstanding the unusual fall of the barometer and sympiesometer, and their still continuing to sink, this day was as fine, and seemed likely to continue so, as any day I had ever seen, therefore we took advantage of it. 3rd and 4th.—Still very fine weather, although the barometer and sympiesometer were lower than I had yet seen them in this country. 5th and 6th.—Two more fine days, with a very low glass shook my faith in the certainty of the barometer and sympiesometer. During those days the wind had been light from N.N.W., and twice before I had known these instruments to be similarly affected during exactly similar wind and weather. The mercury in the barometer had now fallen to 28·94, and the oil in the sympiesometer to 28·52; the thermometer ranging from 40° to 48° Fahrenheit. 10th.—Still fine steady weather, notwithstanding the unusually low fall of the barometer. 12th.—The glasses had at last been rising; and during the past night and this day the wind was very strong, with much rain. The wind shifted from the northern quarter into the southern, drawing round to the S.E., which of course would make the mercury rise higher after being so very low, though the weather might prove extremely bad."—*Ibid.* pp. 426—429. These remarks may be compared with those previously given.

In the summer I have observed the coincidence of fine weather with light easterly winds at the time of new moon, when in South declination, and at the time of full moon to blow strong from the northward. There being many exceptions, however, to the natural action of the wind, produced by localities, I have found it impossible to systematize the indications of the winds and weather satisfactorily. We must, therefore, rest contented with an approximation to certainty in these matters."*

Capt. Monteath says, "It is my opinion that the winds near Cape Horn are greatly influenced by the moon's position, and that easterly winds will in general be found more prevalent during the summer months, when that body has attained a high southerly declination; as proofs, I subjoin the following remarks:—

On the 25th of January, 1824, in lat. 56° 29′ S., long. 70° 57′ W., and the moon's declination 25° S., the wind shifted to the N.E., gradually hauling round to the S.E. until the 30th, when it shifted to the West, it being then new moon, and the declination had decreased to 16° S., the lat. 56° 40′ S., long. 65° 30′ W.

On the 18th of January, 1825, in lat. 56° 42′ S., long. 64° 50′ W., new moon, and declination 20° S., the wind (which had been from the S.W.) shifted to the E.N.E., gradually hauling round to S.E. until the 21st, the moon's declination having decreased to 8° S.; the lat. 56° 43′ S., long. 72° 32′ W. And on the 19th of July, 1825, in lat. 39° 10′ S., long. 88° W., moon's declination, 2° S., and increasing, the wind shifted to the eastward, and continued between the N.E. and S.E. quarters until the 20th, it being full moon, the declination 16° S., the lat. 55° 40′ S., long. 84° 50′ W."

(142.) The SEASONS in the vicinity of *Cape Horn* have also been described by the late Admiral Robert FitzRoy, when commander of H.M. surveying sloop *Beagle*. This gentleman reported that the equinoctial months are the worst in the year, generally speaking, as in most parts of the world. Heavy gales prevail at those times, though not, perhaps, exactly at the equinoxes. August, September, October, and November, are the worst months in the year. Westerly winds, rain, snow, hail, and cold weather, then prevail.

December, January, and February, are the warmest months; the days are long, and you have some fine weather: but westerly winds, very strong gales at times, with much rain, prevail throughout this season, which carries with it less of summer than in almost any other part of the globe.

March is stormy, and perhaps the worst month in the year with respect to violent winds, though not so rainy as the summer months.

In April, May, and June, the finest weather is experienced: and though the days shorten, it is more like summer than any other time of the year. Bad weather is found during these months, but not so much as at other times. Easterly winds are frequent, with fine, clear, settled weather. During this period there is some chance of obtaining a few successive and corresponding observations. To try to rate chronometers by equal altitudes would be a fruitless waste of time at other seasons. June and July are much alike, but easterly *gales* blow more during July.

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* Weddell's Voyage toward the South Pole, 1822-21, pp. 237, 238.

The days being short, and the weather cold, make these months very unpleasant, though they are, perhaps, the best for a ship making a passage to the westward, as the wind is much in the eastern quarter.*

I should say that the summer months, December and January, are the best for making a passage from the Pacific to the Atlantic Ocean, though that passage is so short and easy that it hardly requires a choice of time. For going to the westward, I should prefer April, May, and June.

Lightning and thunder are seldom known; violent squalls come from the South and S.W., giving warning of their approach by masses of clouds. They are rendered more formidable by snow, and hail of a large size.

(143.) The FALKLAND ISLANDS.—Admiral John M'Bride kept a regular journal of the winds and weather at *Port Egmont*, on the North side of the Great or Western Island, Falkland Islands, from the 1st of February, 1766, to the 9th of January, 1767, which was published in 1775 by Mr. Dalrymple. The journal concludes with the following general remarks.

" From looking over the foregoing journal of the winds, for the space of one year, they will be found to prevail in the western quarter, and generally blow a close-reefed topsail gale, with a cold air. In November the winds begin to be more frequent in the N.W. quarter, generally hazy weather, and for the most part blow about sixteen or twenty hours, when it begins to rain; the wind then regularly shifts into the westward, and so on, till it gets to the S.W. by S. and S.S.W., when it blows fresh and clears up. This S.S.W. wind continues for about sixteen hours, then dies away, when the wind shifts again to the N.W. quarter; this continues during December, January, and February, and changes in the manner above mentioned every three or four days. As March comes on, you have these changes but seldom; and, as the winter advances, they are seldom in the N.W. quarter, but rather incline to the E.N.E., which is generally accompanied with sleet and snow. There is not the least proportion in the gales between winter and summer. In summer (as I have before observed), as the winds are in the westward, they blow in such heavy squalls off the tops of the mountains, that it is sometimes an hour before a cutter can row to the shore, although the water is smooth, and the distance but 1½ cable off. In winter the winds are pent up by a keen frosty air. The most lasting gales are those from S. by E. to S by W., and are extremely cold.

" In January and February the thermometer sometimes rose to 52°, but no higher. In August it once fell to 20°, but was seldom lower than 32°"'

Of the Isles, in general, Captain M'Bride has said, " We found a mass of islands and broken lands, beaten by storms almost perpetual. Yet this is summer; and if the winds of summer hold their natural proportion, those who lie but 2 cables' lengths from the shore must pass weeks without having any communication with it."

In a description of the Eastern Falkland Island by Don Louis Vernet, who resided there for several years, it is stated that the climate on this island is, on the whole, temperate—the thermometer never falling below 26° in the coldest winter, nor rising above 75° in the hottest summer; its general range is from 30° to 50° in winter, 50° to 75° in summer. The weather is rather unsettled, particularly in winter; but the showers, whether of rain, snow, or hail, are generally of short duration, and their effects are never long visible on the surface of the ground. Thus floods are unknown; snow disappears in a few hours, unless on the tops of the mountains; and ice is seldom found above an inch thick. Thunder and lightning are of rare occurrence; fogs are frequent, especially in autumn and spring, but they usually dissipate towards noon. The winter is rather longer than the summer, but the difference is not above a month; and the long warm days of summer, with occasional showers, produce a rapid vegetation in that season.

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* But upon this subject see more hereafter, in the Remarks on Passages, &c.—EDIT.

Lieut. Moody, the Governor of the Falkland Islands, in a despatch dated October 1st, 1842, says, "In a former report I noticed the extraordinary dryness of the atmosphere, produced chiefly by the constant winds of summer. During the past winter months of June, July, and August, the excess of moisture and dampness has been equally remarkable, unaccompanied, however, by rain, and, comparatively with England, there was but little snow. The ice has been sufficiently thick to bear the weight of a man twice, for two or three days together; and the thermometer has occasionally been as low as 25°, and once 18° during the night. The wind has been by no means so strong or violent as in summer, and calm days and sunshine occurred very often, much more frequently than in England.

"There have been only three strong gales (one occurred while H.M.S. *Carysfort* lay in the port, and it was accompanied with a heavy fall of snow) since April, except from the 18th to the 24th of September (corresponding with March in England), during which period the equinoctial gales were very violent. Upon the whole, the winter, though considered in this place as very severe, would have been thought mild in England. The dryness of the air is now again beginning to be apparent, and a fine summer is anticipated. Already the thermometer has risen as high as 69°. My present opinion therefore is, that the winter of the Falklands may be considered very mild, but moist, though not rainy, and with little wind. The moisture does not arise from rain or fog, but from the ground; a light soil upon a tenacious subsoil, numerous springs and rivulets, and the absence of the evaporating winds of summer.

"The progress of cultivation, and consequent drainage of the land, will therefore ameliorate the climate."

The wind blows commonly from the N.W. in summer, S.W. in winter, and seldom long from the eastward in either season. The finest weather in winter, is when the wind draws from the West or N.W.; and in summer, when it stands at N.W. or N.E. A North wind almost always brings rain, especially in summer; and East and S.E. winds are constantly accompanied by thick and wet weather. Snow squalls generally come from the S.S.E., South, or S.S.W. Storms are most frequent at the changes of the seasons, and blow commonly from S.S.W. to W.S.W.; but they seldom last above twenty-four hours.—(*Geographical Journal*, Vol. III, p. 95.)

Some further remarks on the winds of the Falkland Islands will be found in the subsequent description of those islands.

(144.) SOUTH GEORGIA and SANDWICH LAND.—The climate of these islands may be briefly described. Here reigns an everlasting winter. Not a tree or shrub is to be seen. The wild rocks raise their lofty summits to the clouds, and the valleys are covered with snow. "Who would have thought (asks Captain Cook, in describing Georgia), that an island of no greater extent than this, situated between the latitude of 54° and 55°, should, in the very height of summer, be in a manner wholly covered, many fathoms deep, with frozen snow, but more especially the S.W. coast? The very sides and craggy summits of the lofty mountains were cased with snow and ice; but the quantity which lay in the valleys is incredible; and at the bottom of the bays the coast was terminated by a wall of ice of considerable height. The coast alone receives warmth sufficient to melt the snow, and this only on the N.E. side; for the other, besides being exposed to the cold South winds, is, in a degree, deprived of the sun's rays by the uncommon height of the mountains."

(145.) South Shetland.—Of South Shetland, the summer may be compared to a dull November in England, and the winter considered as one long starless and desolate night. A perpetual gloom prevails, which the glorious sun seldom or never penetrates, so as to be distinctly seen for many hours together; and as for the stars, they and the moon are scarcely ever visible. Fine days are "like angels' visits, few and far between." Situated in a high southern latitude, and surrounded by a wide expanse of sea, the atmosphere of South Shetland is loaded with vapour, and everything is damp and humid. The sun's rays act feebly at all times; but in their most powerful form there is nothing to collect or to acknowledge their genial influence; masses of snow and ice repress and overpower their effect. The climate may, however, be considered as healthy.

II.—OF THE TIDES.

The following TABLE and DESCRIPTION OF THE TIDES commence with the Coast of Brasil: it then proceeds down the Patagonian Coast, &c., to Cape Horn, and next with the Coast of Africa, down to the territory of the Cape of Good Hope.

Place.	High Water, Full and Change.	Rise at Springs.
SOUTH AMERICA.		
	h. m.	ft.
Para	12 0	11
San Joao	6 20	14
Salinas River, anchorage	8 15	
Manoel Luiz	5 0	12
Maranham	7 0	17
Tutoia, anchorage	5 15	12¾
Jericoacoara	5 15	8
Aracati	6 0	8
Ceara	5 35	8¼
Fernando Noronda	4 0	6
Las Rocas	5 15	10
Cape St. Roque	4 14	8-10
Parahyba	5 10	10
Pernambuco	4 45	8
Maceio	4 30	8½
Bahia	4 25	8
Os Ilheos	4 30	
Martin Vas Rocks	3 45	
Abrolhos	3 20	6
Nossa Senhora da Victoria	3 0	4
Benevente	3 0	5
Macahé	2 30	9½
Porto Frio	2 40	4½
Rio Janeiro	3 0	4
Sapetiba Bay	2 0	5½
Ilha Grande, Paratio	1 45	5½
San Sebastian	2 0	4
Ubatuba	4 0	4¼
Santa Catharina Island	2 40	6
Paranagua	3 0?	6½
Buenos Ayres	6 40	irr.
Rio de la Plata, C. Castillos	8 30	irr.
Tristan d'Acunha	noon	4-6
Port Belgrano	6 0	12
Union Bay	3 10	12
Colorados River	4 0	9
Sans Blas, Rubia Head	1 30	12
Rio Negro	11 0	14
Port San Antonio	10 45	18-30
Sea Bear Bay	12 45	20
Port San Josef	10 0	30
Nuevo Gulf	7 0	10
Port Santa Elena	4 0	17
Port Melo	3 40	15
Port Desire	12 10	18½
Port San Julian	10 45	30
Santa Cruz River	9 30	40
Port Gallegos	8 50	46
Coy Inlet	9 30	40
San Sebastian Bay	7 0	
Staten Island	4 30	8
Le Maire Strait	4 0	7
Goree Road	4 0	8
Orange Bay	3 30	6
Cape San Diego	4 30	10
Cape Penas	6 42	12
St. Martin Cove, Cape Horn Islands	3 50	8
Falkland Islands, West Falkland.		
Ship Harbour, New Island	10 30	
Shallow Harbour	9 30	6
Hope Harbour	8 10	7
Port Egmont	7 30	11
Manybranch Harbour	7 40	7½
Fox Bay	7 0	6
Port Edgar	7 15	6
Port Albemarle	7 15	7
Port Stephens	7 45	7½
East Falkland.		
Port San Carlos	7 0	8
Port San Salvador	8 10	8
Port Sussex	8 15	6
Port King	7 30	5
Ruggles Bay	7 30	5
Falkland Sound, S. entr.	7 0	
,, N. entr.	6 45	
Bay of Harbours	6 0	5
Adventure Sound	5 30	5½
Low Cay	5 0	5½
Walker Creek	6 20	5½
Darwin Harbour	6 30	5½
Mare Harbour	6 0	6
Id. Harb., Choiseul Sound	5 20	6
Port Pleasant	5 0	6½
Port FitzRoy	4 45	6
Port William	5 15	7
Berkeley Sound	5 0	7
AFRICA, WEST COAST.		
Gallinas River	6 45	4
Monrovia	6 0	6

Place.	High Water, Full and Change.	Rise at Springs.	Place.	High Water, Full and Change.	Rise at Springs.
	h. m.	ft.		h. m.	ft.
Junk River	5 45	5	Banoko	5 24	5
Edina	5 50	4	San Bento River	4 30	5
Grand Cestos	5 20	4	Corisco Island	5 0	7
Sangwin River	5 15	4	River Gaboon, entrance	3 52	8
Sinou	5 0	4	Cape Lopez	4 30	4-6 ?
Cape Palmas	4 30	4	Mayumba	4 35	7
Tabou River	4 45	3-4	River Congo	4 30	6
Grand Lahou	4 20	4	San Paul de Loanda	4 30	5
Axim	4 30	4	Ascension Island	5 30	2
Cape Three Points	4 0	4	St. Helena Island	3 11	3
St. George d'Elmina	4 30	6	Lobito Bay	4 15	5-6
Cape Coast Castle	4 30	6	Benguela	3 45	5-6
Sherbro River, Bobs Id.	7 50	6	Torta Bay	3 30	3
River Volta, entrance	4 30	3	Great & Little Fish Bays	2 30	5-6 ?
River Lagos, bar	6 0	3	Port Alexander	3 0	5
River Benin	4 30	7	Walvisch Bay	1 54	6
River Forgados	4 22	5	Port d'Ilheo	3 0	8-10
River Ramos	4 20	5	Spencer Bay	10 50	5-6
River Dodo	4 17	5	Ichabo Island	1 0	6
River Pennington	4 15	5	Angra Pequena	2 30	8
River Middleton	4 15	5	Elizabeth Bay		5-6
River Niger, Nun (entr.)	4 8	6	Port Nolloth	2 35	5¼
Brass River	4 0	6	McDougall Harbour	2 30	5¼
Bonny and New Calabar Rivers	4 50	6	Hondeklip Bay	2 30	5½
			Roodewall Bay	2 30	6¼
Cameroons River	5 15	7	St. Helena Bay	2 30	6
Fernando Po	4 0	7	Saldanha Bay	2 30	5
Prince's Island	3 45	4½	Table Bay	2 40	5
St. Thomas Island	3 25	4½	Hout Bay	2 20	5
Anno Bom Island	3 45	5	Simon's Bay	2 44	5¼

NORTHERN COAST OF BRASIL.—We are, as yet, but imperfectly acquainted with the tides on this coast, but the following remarks will serve to show that the time of flowing, or high water, is progressively later from East to West. At the entrance of the Jaguaripe or Aracati River, near the meridian of 38° W., the time of high water, on the full and change days, is about 6^h. Spring tides here rise 8, and neaps 4 feet. The highest tide is two days after the full and change. The flood stream outside sets constantly to the N.W. along shore, but is seldom stronger than two-thirds of a mile in an hour.

In the *Bay of Seara*, and coast next westward, very little tide is perceptible; but between the *River Perguizas* and *St. Anna's Isle*, near Maranham, there is a regular flow, setting directly on the coast, and which runs an hour longer than the ebb. It has been conjectured that there may be here an under-tow, always running to the westward. In the *Bahia* or *River of St. José*, on the East of Maranham Island, the tide sets with great strength; the flood from E.S.E., the ebb from W.N.W. High water at about 6^h p.m.

From off the *Isle of Santa Anna* the flood sets to the S.W. into Maranham Bay. Its rate in the offing is commonly more than half a mile in the hour; but, on advancing, its strength increases. In the harbour of Maranham the tide makes at least half an hour before it does outside. High water at about 7^h.

At the *Island of St. Joao*, or *St. John*, the tide runs very strongly N.E. and S.W. High water at about 6ʰ 24ᵐ p.m.

Navigators leaving *Maranham* for the coast to the westward have been advised to take three or four days after the full and change of the moon for the time of starting, as the spring tide, at times, previously runs at the rate of 4 miles an hour.

Between St. Joao and Salinas (long. 47° 15′) Captain the Hon. W. Wellesley, in H.M.S. *Sapphire*, found a strong easterly and south-easterly stream running off the shore. Whenever the *Sapphire* was at anchor hereabout, the flood was found to set S.E., and the ebb East. The pilots say that this is always the case from December to May or June, owing to the heavy rains. The *Pickle* schooner, ignorant of this particular, was set back from Atasia to the Bay of Turivazo, a distance, eastward, of nearly 120 miles, and was unable for some days to make head against it. A French brig of war was likewise set in the same direction.

Near *Salinas*, during the rainy season, from September to May, the tide along the coast has been found constantly setting from S.E. to East. Between this and the *Rio Para* the tides run very strong, and are very uncertain in their direction, owing to the numerous small rivers and banks in the vicinity, and more especially to the streams of the great River Maranon, which affect them on the West. High water at Salinas about 8ʰ.

M. Tardy de Montravel says that the tides on all the coast between Salinas and Para are felt at 20 miles off; near the land, where they are strongest, the flood runs into the bays, that is, to the S.S.W., at the rate of 1½ and 2 miles; the ebb to E.N.E., at three-quarters to 1 mile an hour.

On the *Braganza Bank*, off Point Tigioca, the time of high water appears to be from 10ʰ to 10ʰ 30ᵐ. At Para it flows at 12ʰ 5ᵐ p. m., and vessels carry a regular tide up the river. In the port the tide runs with great strength, and without the river, to the N.W., the ebb stream runs strongly until it is blended with those from the Maranon, which set more to the North.

EASTERN COAST OF BRASIL.—We now revert to the *Eastern Coast of Brasil*, from Cape St. Roque southward, and find that at Pernambuco and Bahia, or St. Salvador, the time of high water is 4ʰ 45ᵐ, and rise from 6 to 8 ft. In the harbour or port of Cape Frio the time is 2ʰ 40ᵐ, and the rise only 4 ft. In the channel, within the Island of St. Sebastian, the time has been given as 2ʰ 30ᵐ, but the rise and fall here is scarcely perceptible, at least not regularly so, and the current sets according to the wind. Hence the tide at Rio Janeiro is so little, that it seems to have almost escaped notice; but Captain Owen gives it as 2ʰ 40ᵐ, and rise 4 feet.

Within the Harbour of ST. CATHERINE the ebb and flood are very unsettled, and seem to depend almost entirely on the wind. The flood sets in from the North, the ebb from the South; and as the wind is almost always from the sea, the ebb, with a fresh northerly wind, is scarcely apparent, and seldom lasts more than two or three hours. The time of high water, at new and full moon, has been given at 2ʰ 40ᵐ, and the rise 6 feet.

In the RIVER PLATA, likewise, there do not appear to be regular tides, but currents, as uncertain in their duration as they are irregular in their rate and direction. In fine settled weather, with moderate winds, a rise of 5 or 6 ft. has, however, been found here.

PATAGONIA, &c.—*Off the Patagonian Coast* the flood tide sets to the northward, parallel with the coast. Near Virgin's Cape (lat. 52° 18′) the northerly tide ceases at about 4 hours before the moon passes the meridian; in the Gallegos River it is high water, on the full and change, at 8^h 50^m, and the rise is 46 ft.; at Cape Fairweather, 9^h, rise 28 ft.; at Coy Inlet, between 9^h and 10^h; at Port Santa Cruz, about 9^h 30^m, but in the offing 2 hours later; anchorage off Port Julian, 10^h 45^m, rise 30 ft.; at Sea-Bear Bay, 12^h 45^m, rise 20 ft.; Port Desire, 12^h 10^m, rise 18½ ft.; Port Sta. Elena, 4^h p.m., rise 17 ft. In the offing of Port Desire the tides are 3½ or 4 hours later than they are in-shore, which is probably owing to the eddy tide setting out of St. George's Bay.

(146.) STRAIT OF LE MAIRE, &c.—On the S.W. coast of Tierra del Fuego, westward of the Strait of Le Maire, the tide is felt strongly, causing races and eddies near the projecting points. In the offing the current or tide sets toward the strait from 1 to 3 miles an hour, when the water is rising on the shore, and the wind westerly. While the water is falling it runs with less strength, and with an easterly wind is not felt at all.

In the Strait of Le Maire it is high water at 4^h, but the flood tide continues to run northward until about 6^h p.m. on the day of new moon. The flood tide is much stronger than the ebb along all this coast, and it sets from the westward; but northward of Staten Island and the Strait of Le Maire the flood tide runs north-westward.

Although 5 and 6 hours are the average times, the tides vary much, being sometimes nearly an hour earlier, and sometimes as much later, on the day of full or new moon.—*Capt. FitzRoy.*

They will assist a vessel materially in her passage, if taken at the proper time. Off Cape Diego, the N.W. point of the strait, when the tide opposes the wind and swell, there is, however, a heavy and, for small vessels, dangerous race of tide; and eddies may, at times, be seen here in every direction.

In Good Success Bay it is high water at 4^h, and the rise is 6 or 8 ft., according to the wind.

From Cape St. Diego, to the northward, the tide sets North and West along the shore, from 1 to 3 miles; the ebb in a contrary direction, but not so strongly. In the strait the flood tide runs northward from 2 to 4 miles in the hour, near the cape, and from 1 to 3 miles in mid-channel, more or less, according to the strength and direction of the wind. The ebb sets to the southward about 1 mile an hour.

(147.) Staten Island.—Along the North and South sides of Staten Island the flood tide sets from East to West. It is high water, on the full and change, at the anchorage within the New Year's Isles, as well as on the East side of Strait Le Maire, at 5 hours. The current is very strong, running from 4 to 6 knots. Off Cape St. John is a tide race, which extends to some distance off the point.

Off Cape Horn and the coast to the westward the stream is strong and irregular. It generally sets eastward, and sometimes 2 miles an hour, as shown hereafter.

(148.) FALKLAND ISLANDS.—Concerning these islands, Capt. FitzRoy says, "The tides differ much as to strength and direction in different parts of the Archipelago, but the times of syzygial high water only vary from 5^h to 8^h, and the rise of tide is almost similar everywhere, about 4 ft. at neap, and 8 ft. at spring tides. The principal swell of the ocean, which causes the tidal streams from these islands, comes from the S.E. Scarcely any stream is perceptible on the S.E. coast of East Falkland; but along the North, South, and West shores it increases in strength, until among the Jason Islands it runs 6 miles an hour, causing heavy and dangerous races. Off Berkeley Sound, across the entrance, and near Cape Carysfort, the tide runs about 2 knots at its greatest strength, and thence westward it increases gradually. Into Falkland Sound the tide flows from both openings, and meets near the Swan Islands; showing, I apprehend, that the principal wave or swell impinges upon the coast considerably eastward of South.

"The tidal currents are stronger along the northern shores of the Archipelago than they are along the South coasts, and the stream of flood is stronger than the ebb. At Port William, the easternmost harbour, the time of high water at full moon is 5^h, and thence westward the times increase gradually to 6^h 30^m at New Island, which is nearly the westernmost of the group.

"Generally speaking, the sea is much deeper near the southern and western shores than it is near those of the North; and to those local differences I attribute the varying velocity of the minor tide streams."

III.—OF THE CURRENTS.

(149.) The phenomena of Ocean Currents present to our view one of the most mighty agents in the distribution of climate and other effects in operation on our globe. Their nature, however, is not generally well understood, the subject having remained for many years nearly stationary from the days of Major Rennell, with whom it originated. The currents of the North Atlantic have naturally received the greatest attention, and several difficulties were encountered in forming an entire system upon the data collected in that part of the ocean. However, by extending the investigation to other areas, and especially to the Pacific, which till recently has had but little attention, we are enabled to supply some deficiencies in this.

In our North and South Pacific Directories, and in that for the Indian Ocean, we have described the tropical currents of those great oceans, and demonstrated that the great westerly drift becomes broken up, and enters the Oriental Archipelago through the numerous channels dividing the islands, and thus becomes neutralized as to its westward set. We may, therefore, suppose that the open spaces in this archipelago will have a higher temperature than the rest of the ocean, and also be the initial point of the great current systems which circulate around the Indian and Atlantic Oceans.

A continuous current may thus be traced from the Indian Archipelago, between Timor, &c., and Australia, across the Indian Ocean, and nearly surrounding the globe, across the Atlantic to the shores of Britain, and into the Arctic Sea.

(150.) This mighty circulation, which is described in the Journal of the Royal Geographical Society, Vol. XXIII, 1853, is similar to what is going on in the Pacific, and their combined effects present one of the grandest features of nature, and the importance of which cannot be too greatly appreciated by the mariner.*

(151.) A very brief notice of the general system may be here given, to elucidate the subsequent details. The revolution of the earth and the solar heat causes the phenomena of the trade winds within the tropics. These blow from N.E. and S.E., meeting near, but *not on*, the Equator, a fact due to the unequal distribution of land and water in the two hemispheres. The line of junction is thus to the North of the Equator, between lats. 4° and 10° N., as shown in (11), page 36, and on pages 49, 50, &c.; and this belt of calms is the well-known obstacle to ships crossing it in the Atlantic and in the Pacific, North or South of the tropics, or of lat. 30° North or South. The winds blow from the westward with almost as much regularity as those from the eastward within the tropics, more especially beyond the influence of the land.

(152.) To the direction of the wind that of the *surface* current (with which the sailor has only to deal) is owing. And in each ocean it will be found that the waters circulate around it on the parallel of 30°, flowing westward between this and the Equator, and eastward between it and the Poles; and towards the Equator on the eastern sides of each ocean, and from it on the western.

(153.) Thus the circulation around the basin of the Ethiopic Ocean is first to the westward around the Cape of Good Hope (the Agulhas Current), which ceases at a short distance beyond the Cape. The north-easterly set from the Antarctic regions, setting against the West coast of Africa, then passes as a cold current northward along the West coast (the South African Current), up to the Equator; thence westward across the ocean (the Equatorial Currents), a portion passing along the North coast of Brasil, into the Mexican Sea, and emerging thence in the well-known Gulf Stream; and the other branch passing southward down the coast of Brasil (the Brasilian Current), whence turning to the eastward it re-enters the Indian Ocean, South of the Agulhas Current, as the Southern Connecting Current. These separate branches will be described, and will be found analogous to those existing in other oceans.

(154.) The numerous observations on the temperature of the different currents which have been made and collected of late years, enables us to indicate the sources and progress of these well-marked streams with tolerable certainty; and their general contour, as given in the chart illustrating this section, may be taken as an approximation to an exact portion of their various courses. A few words on the surface temperature of the ocean will be given hereafter.

(155.) The currents of the Atlantic Ocean, northward of the Equator, in connection with those to the southward of it, have been explained in our North Atlantic Memoir.

The prevalent currents of the Ethiopic Ocean may be briefly enumerated.† That remarkable feature of the ocean, the *Agulhas Current*, which is generated by the great drifts of the Indian Ocean, both eastward and westward of Madagascar, flows westward, and sets over the edge of the great Bank of Agulhas; whence it passes the meridian of the Cape of Good Hope, and is there stopped, but a branch or set-off rounds partially to the S.W., South, S.E., and East, as shown hereafter.

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* See also a paper on "Ocean Currents and their Influences," by A. G. Findlay, F.R.G.S., in the Journal of the Royal United Service Institution, vol. xiv, 1870.

† This explanation will be clearly understood by referring to the illustrative chart of the currents.

The SOUTH AFRICAN CURRENT, a cold stream, called by Major Rennell the *South Atlantic Current*, sets northward and north-westward, though, as will be seen, of different origin from the Agulhas Current; it sets in the direction of the African coast, and nearly parallel thereto, until it has passed the latitude of the River Congo (about 6° South), beyond which it has a decided north-westerly course, until it blends and unites with the *South Equatorial Current*, between the parallels of 1° and 5° South; and this united stream sets to the West, W.N.W., and N.N.W., (with a great set-off or drift to the North, N.N.E., &c., during the African S.W. monsoon), as described in our North Atlantic Memoir.

When this South African Current has followed the direction of the coast to the northward (in a reverse direction to the stream which is found on the same parallels on the East side of Africa), and having attained the latitude of the islands in the Bight of Biafra, it turns to the westward, and joins the great tropical drift.

To the North of this, between it and the Guinea Coast, is the *Guinea* or *Equatorial Counter Current*, or the *African Current*, which is a singular phenomenon of a current running in a reverse or eastward direction, between the region of the N.E. and S.E. trade winds, and this is found at times, as will be seen, to extend westerly across the ocean, and as far eastward as Fernando Po.

The central part of the ocean, North of the tropic of Capricorn, is under the immediate influence of the S.E. trade wind, which impels its surface waters to the westward. This immense drift sometimes reaches nearly home to the Brasilian shores; but on approaching those shores it appears more frequently to form a current, setting in a counter direction along shore to the *southward*, and which is said to have been traced nearly from Pernambuco to Tierra del Fuego; but circumstances prove that it is variable, and always modified by the prevailing winds.

From the River Plate there is commonly a great outfall of fresh water, which has been traced many leagues to the eastward, and which is lost in the variable currents found between the westerly or central drift, on the North, and a wide *easterly* current commonly prevailing between the parallels of 30° and 35° to 40° S. The last, which has been denominated the *Southern Connecting Current*, greatly facilitates the passage of ships bound to Australia and to ports of the Indian Ocean, and is a portion of that great eastward drift of the Antarctic Current.

On the parallels South of the Connecting Current the great drift of the Antarctic waters, when not disturbed by local winds, appears to be in a north-easterly or E.N.E. direction. We find it thus at a certain distance from the S.E. coasts of Tierra del Fuego and of the Falkland Islands, a consequence of the more prevalent winds, which are westerly. As in the Arctic or Northern Icy Ocean, the great flux of water is from the N.E., so in the Antarctic it is from the S.W. or W.S.W., setting to the N.E. and E.N.E. to the meridian of 60° E., and probably much farther in that direction.

The particular details are as follow, taking the currents in the order above mentioned.

1.—The Agulhas Current.

(156.) This current has been described as a perennial or constant current, which sets into the Atlantic Ocean round the entire southern extremity of Africa. It varies in its velocity, in different situations, and at different periods, from 5 miles to 1 mile an hour. Ships have been frequently carried to the westward, quite round the Cape of Good Hope, even against the strongest N.W. gales, by this current; in such case the sea breaks so short, that is, the waves are so high and close to each other, as to occasion much strain upon a vessel, which, when she is deeply laden, is always dangerous, and frequently fatal.

In consideration of the operation of this current, those from the eastward must take care, in the summer months, when the S.E. winds prevail, not to fall to leeward, for it will be very difficult to gain False Bay, if a ship first make the Cape land when to the westward of it, during a strong S.E. wind. At times, ships bound into Table Bay have been obliged to bear away for St. Helena, in consequence of passing the Cape in the night, and being unable to beat against a strong easterly wind and leeward current.

The vicinity of the Cape is notorious as the boundary of very different kinds of weather. To the eastward of it, ships homeward bound have, in general, unsettled cloudy weather with variable winds; but so soon as they have got to the westward of the promontory, the weather commonly becomes favourable, with a steady south-easterly wind aiding the current; this may be expected more particularly in the summer season.

(157.) Major Rennell was the first who, in 1777, explained the setting of the current on and off the Bank of Agulhas in a manner equally ingenious and satisfactory, and he showed that the main stream of the current conforms to the direction of the edges of the bank, and not the shore, as generally imagined. The particulars of the currents, from his subsequent researches, are as follow:—

The two streams of current from the Indian Ocean, the one from the Mozambique Channel, down the S.E. coast of Africa, and the other from the ocean at large, both drift-water running south-westward, join nearly opposite Point Padrone, or longitude 26½° E., and probably near the edge of the Agulhas Bank, about 40 miles from shore.

These streams united, between the meridians of 25° and 29° E., form one stream, of 90 to 100 miles in breadth, which acquires a moderate velocity on the side toward the Agulhas Bank. Near the meridian of 29° it has been found to set south-westward, more than 4 miles an hour, but more frequently 3½, 3, and 2½ miles.

From the meridian of 25½°, the stream gradually turns to the West; its main body continuing to the border of the bank, which extends 150 miles, in a direction W. by S. ½ S., whence it changes to S.S.W. The main body, or central part of the stream, appears to strike on the bank, nearly W. by S., about lat. 35½°, and long. 23°, and is immediately deflected southward to S.W. by W., and, by the time it arrives on the parallel of 36°, to S.W. It becomes S.S.W. before it reaches 37°. In 37½° it sets due South, on the meridian of 22° E.

(158.) Although the main body of the stream is turned aside, on coming upon the bank, from its general western course to one more southerly, a large portion of it comes over the edge of the bank, in some parts to 20 or more miles within the border, in 100 to 120 fathoms of water, and with a velocity of about 45 miles in the 24 hours.

The check given to the current by the eastern edge of the bank does not turn it aside at once, but it acquires the new direction by degrees, and a considerable portion of the main stream passes over, and to some distance within, the edge of the bank; more particularly going southward, where the water on the bank becomes deeper.

From what is known, it has been concluded that the bank, with a depth of about 100 fathoms, actually turns the stream as the stray current advances; when it must be inferred that its main body is, at least, 100 fathoms in depth. No other reason appears why it does not pass directly across the bank, in the line of a slow westerly current, where the shallowest depths are from 40 to 50 fathoms.

(159.) The preceding description relates only to the main body of the stream; for it must be observed that a large portion of it is diverted to the West and S.W., spreading in a fanlike shape over the bank, in all directions between West and S.W. by S.; and, having crossed over to the western border, it changes its direction toward the N.W., but with a small degree of velocity compared with that of the main stream.

That part of the current which proceeds westward over the bank, between the parallels of 34¾° and 35⅔°, appears to be formed, generally, of the northern part or border of the *main* stream, which, by passing to the North of the angle where the bank turns suddenly to the S.S.W., avoids that opposing drift which turns the rest to the southward, and passes onward, on its original course, between the W. by S. and W.S.W., spreading itself to nearly a degree of latitude in breadth, but with a reduction of about three-quarters of its original velocity. This, therefore, appears to be the cause of the westerly course of the current across the northern part of the bank; while on the southern part it is generally south-westerly, as being formed of off-sets from the main body of the current in its passage to the S.W., and this part is generally stronger than the northern part.

That portion of the stream which passes round the bank, and over the deep water at its southern extremity, and finally passes along and over its western edge toward the N.W., although stronger than that which passes across the bank, bears no comparison, in velocity, to what passes down the eastern side; being, indeed, no very large proportion of the great Agulhas Stream.

On the S.W. quarter of the bank, between 36½° and 37° S., and between the meridians of 19° 40′ and 21°, the current appears to form eddies, or a kind of whirl; and hereabout the easterly or *Connecting Current*, from the South Atlantic, passes at no great distance from the bank; the latter appears often to disturb, and absolutely impede, the opposite current, which sets round the bank, being by far the more powerful of the two in this place, and it is apparently the cause of turning the Agulhas Current to the eastward, after the eastern side of the bank has already turned it from a westerly to a southerly direction.

An eddy current has also been described as setting from the shore of Cape Agulhas to the southward, the general course of which has not been clearly defined. It is mentioned hereafter.

Captain Nares, H.M.S. *Challenger*, in 1873, remarks:—An extended series of observations are required as to the cause of the stoppage or turning of the Agulhas Current. Our observations indicate that the broad and comparatively sluggish "South Atlantic Drift Current," running to the eastward before the continuous westerly winds, accumulates its waters against the West coast of Africa, raising the level of the sea sufficiently to prevent the Agulhas Current continuing its course, and swallows or diverts nearly the whole of it; a very small portion escaping to the northward round the Cape during the southerly winds, intermixing with the colder water of the drift current, which also throws out an off-shoot to the northward as it strikes against and meets the African coast and Agulhas stream.

(160.) Thus far the stream has been correctly described by Major Rennell, who was the first to point out its features. In our Directory for the Indian Ocean, it is shown that the South extremity of Africa is alternately within the influence of the S.E. and easterly winds during the southern summer, and of the westerly anti-trade winds during the winter, and as the line separating these two systems shifts with the seasons from northward to southward and the reverse, their line of separation is marked, especially in the winter, May to August, with those fierce gales which make the passage round the Cape to the westward a matter of much difficulty at times.

(161.) Captain H. Toynbee, F.R.A.S., has defined the south-western limit of this great tropical set with more precision than has been done before. This talented officer, by close observation on the temperature and condition of the sea, especially during five voyages out and home around the Cape, from finding the constant repetition of certain facts at the same places and at the same time of year, considers that they point to some important conclusions in the physical geography of the sea. In the voyages referred to, the Cape was passed to the south-eastward, on about the parallel of 40° S., in August and September, the homeward voyage near the land in February.*

(162.) In each of the outward voyages Captain Toynbee came upon a patch of very cold water, temperature 47° to 49° Fahrenheit, in lat. 40° S., long. 3° to 7° E.; and here the current was to the S.E. The specific *gravity* throughout (a subject on which more hereafter) was 1·027. Sharp hail squalls and unsettled weather prevail in it. The following Table will give the particulars of these five voyages.

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* See Journal of the Royal Geographical Society, vol. xxxv., 1865, p. 147, et seq.

Date.	Lat. S.		Long. E.		Current. Direction and Rate in 24 Hours.	Surface Temperature	Remarks.
	°	′	°	′	° ′	°	
1860 Aug. 31	39	50	2	45	S. 74 E. 14	47.2	In this cold water we had ragged-looking hail-squalls; the sea kept cool to 30° 14′ S., and 14° 37′ E., when it suddenly rose 15°.
1861 Aug. 21	38	39	5	18	S. 77 W. 10	49.7	A heavy squall: the sea 8° warmer the next day.
1862 Sept. 1	40	6	9	41	In 3 days. S. 12 E. 62	48.8	Sharp squalls: the sea 7° warmer the next day.
1863 Aug. 23	38	18	5	20	S. 86 E. 38	51	High W.S.W. sea; the sea 10° warmer the next day.
1864 Aug. 29	39	24	6	40	In 3 days. S. 42 E. 45	50	Wind shifted to W. in a squall: the sea 13° warmer in 14° 56′ E. long.

This spot is interesting as one in which Mr. Towson argued, and Captain Toynbee in a measure confirmed (at least for this season), that hereabout the ice-drifts from the S.W. come to a standstill, and then after hanging for some time they move off to the south-eastward. This is noticed here, as it evidently must be beyond the limit of the westerly drift of the Agulhas Current.

(163.) But upon sailing farther eastward on the same parallel, the warm waters of the Indian Ocean are encountered.

From this position we endeavour to steer East, keeping in about 40° S. lat., and when in about 17° E. we have, each voyage, suddenly come into water above 60°. By the time we get to 23° E. long., we have our warmest water, sometimes up to 67°; but the most remarkable part of it is, that we pass through *streaks* of hot and cold water, although sailing in the same latitude. This kind of remark is very common in my logs:—9 a.m., long. 18° 20′ E., surface water 55°. 3 p.m., surface water up to 67°. These fitful changes are quite the order of the day in 40° S. lat., from the meridian of Greenwich to 50° E. long., where we have each voyage come into a colder patch of water, sometimes down to 40°. In the changeable water we have a very high confused sea, and in this colder patch frequent hail squalls. The current is generally to the eastward, seldom exceeding a mile an hour; though once in 24° E. long., whilst passing from water at the temperature of 66° down to water at 56°, we experienced an easterly current of 80 miles in 24 hours. (See foregoing Table.)

The streaks of warm water contain all the beautifully-shaped and coloured shells and crustaceans which we have found in the equatorial regions, whilst the streaks of cold water have a differerent class of inhabitants. The specific gravity of the cold water is about 1·027.

The following is the Table extracted from five logs :—

Date.	Lat. S.		Long. E.		Current. Direction and Rate in 24 Hours.	Surface Temperature.	Remarks.
	°	′	°	′	° ′	°	
1860 Sept. 14	40	58	50	0	S. 76 E. 25	44·5	This was at 6 a.m., having fallen 17° since 8 p.m. of the evening before, with so confused a sea that we had rolled a main top-gallant mast away; by 9 a.m. it was 54·5°; and at 3 p.m. on the 15 it was 47·3°.
1861 Aug. 31	40	2	52	35	E. 64	45·8	The day before the sea was 59·5°, and the day after 59·2°.
1862 Sept. 9	41	24	41	0	N. 55 W. 9	44	After running about 300 miles to the eastward the sea was 56°; and after 90 miles more to the eastward it was down to 44° again.
1863 Aug. 31	40	15	43	40	N. 75½ E. 10	46·2	At 8 p.m. of the 30th, only 100 miles further W., it was 61°; and at 8 p.m. of the 31st, about 100 miles further E., it was 60°, and a heavy N.W. gale blowing.
1864 Sept. 11	42	50	47	50	Easterly.	40	The sea had been below 50°, from 32° 16′ E. long., with foggy weather: on the 12th, at 3 p.m., it was up to 58°. In this cold water we had a current of a mile an hour to the eastward.

(164.) It seems most probable that if it were not for the rush of warm water from the Indian Ocean down the Mozambique Channel, the large masses of ice which are known to travel to the north-eastward, and come so near the Cape of Good Hope, would travel further on the same course, and render the passage round that Cape much more dangerous than it is. Further, there seems reason to suppose that this ice-bearing current divides into two, part of it supplying the remarkably cold water which is found in Table Bay, and then running North, forms an equatorial current of so low a temperature as 70°, the other part carrying the ice which Towson finds crossing the meridian of Greenwich in a south-easterly direction. This ice is most probably fended off by the cushion of warm water, and being obliged to work round its southern edge, travels to the N.E. again, forming another curve East of the Cape of Good Hope, like that which Towson gives East of Cape Horn. But thanks to the influence of the warm water with which it is in contact, much is wasted away before it gets North of the Crozets; still, Towson gives several icebergs on that spot, and I have once met them there myself, while the very cold water which we *always* find there shows that something of the kind must happen. If the ice does incline to the North after dipping to the southward round the warm water off the Cape, it supports Towson's theory, that there is as much ice to be met with in lower latitudes as in 51° S. lat. So that 52° is the best latitude to choose as the southern limit for going to Australia.

(165.) A general summary of the subject, as derived from Captain Toynbee's observations, is thus given by Comm. C. George, R.N., who projected his data:—

Off the Cape of Good Hope the two currents meet near the parallel of 39° S. and the meridian of 20° E., but the line of meeting may alter along that parallel in different seasons. The apparent effect of the junction of the warm and cold currents is to drive the latter about two degrees further to the southward, and also to divide each of the currents into two parts: some portion of the current is turned to the northward, and by its specific gravity it runs under the warm current, strikes the western side of the Agulhas Bank, and comes to the surface near Table Bay, where its temperature is 52°, while at 60 miles off the shore the warm is current is running north-westerly at a temperature of 68° to 70°—a difference of 16 to 18 degrees. At this meeting of the currents the greater portion of the warm current continues to flow to the westward, between the Cape and the parallel of 39°; while some portion of the warm current is here turned, and carried to the eastward by the cold or ice-bearing current, which, after sending off a portion towards the Cape of Good Hope, continues its easterly direction along the parallels of 40° and 42° S. The cold stream, after passing Table Bay, continues to run northerly along the West coast of Africa, and its existence has been noticed by T. Baines, Esq., F.R.G.S., at Walvisch Bay, in lat. 23° S., where he found the water so cold and bracing as to be almost unpleasant for bathing, in the same year as the observations were made by Captain Toynbee at the Cape.

That the boundary of the cold water remains somewhat stationary, as noticed by Captain Toynbee, during the months of August and September, is supported by the fact that it was found in the same locality for four consecutive years, viz., between the parallels of 39° and 40° S., and between the meridians of 4° and 6° E.: also that the warm current follows the same law is established, for on the same parallel, and near 15° E., the warm current is encountered and found there during the five years of examination, and the like in many other places. After passing the meridian of 25° E., the cold current is pushed 2° further South, and still running to the eastward carries the warm surface-water with it.

(166.) A very important addition to our knowledge of this remarkable current is the elaborate investigation of the surface temperature of the sea around the South extremity of Africa, by Lieut. J. E. Cornelissen, the Director of the Royal Netherlands Meteorological Institute at Utrecht,* published in 1872.

We cannot give here the interesting diagrams of the temperature, in which the mean of many observations is given for each square degree of latitude and longitude, and thus the progress and relation of the polar and tropical streams is very clearly shown. Generally these results entirely confirm the speculations of Major Rennell, derived from very imperfect data, but they also develope some new features, which may be briefly described here.

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* "De Temperatuur aan de Oppervlakte van het Zeewater rond Afrika's Zuidpunt," Utrecht, 1872.

The chart showing the means for the whole year, derived from 28,582 observations, shows that the Agulhas Current, in passing to the westward, is twice deflected before it runs to the southward, and this double interference is shown in each of the three-monthly charts subsequently given. In the first instance the warmer water forms a sort of tongue between longitudes 29° and 32° E., and extends from lat. 37° to 39° S., while the greater portion passes to the S.W., and bears to the southward between longitudes 25° and 18° E., and is found as far South as lat. 44° S. Over the Agulhas Bank of soundings the polar current evidently passes within the warm Agulhas Current.

(167.) In the southern winter (June, July, August, 7,400 observations), the eastern tongue of the Agulhas stream is less distinctly marked than in other seasons, but is still plainly shown on the meridians of 30°—31° E. The western limit of the stream is on the meridian of about 17° E. The warmer water presses close up to the S.E. coast.

In spring (September, October, November, 6,199 observations), the bifurcation is more distinctly marked than in winter, the eastern tongue in the meridian of 30° E. extends beyond lat. 40°, while the principal body of the stream less pressed on the coast runs to long. 28° or 29°, and is felt as far as lat. 45°, and from those meridians to long. 26° E. In summer (December, January, February, 6,612 observations), the stream is divided on the meridian of 27° E., and the easternmost portion is of much greater extent, reaching to lat. 42° S., while the western branch pursues its course to the S.W. as far as long. 17° E., and to lat. 44°. In autumn (March, April, May, 5,917 observations), the eastern branch becomes more contracted, still on the meridian of 30°, while the more extensive south-western branch reaches to long. 15°, lat. 44°. Throughout the year the cold current appears to run over the bank of soundings on the S.W. coast of Africa, between it and the warmer Agulhas Current; this cold stream being narrowest in winter, and broadest in the summer. The meeting of these warm and cold currents is well known to be the cause of great atmospheric changes in stormy weather, and many singular phenomena have been encountered. We extract the following from the remarks attached to the charts, showing the surface temperature of the South Atlantic Ocean, published by the Board of Trade in 1869 :—

Captain English, *British Lion*, January 13th, 1858, lat. 38° 3', long. 16° 30' E., at 10 p.m., distinctly felt a great change in the water, and at the same time was taken by the lee with a shift of wind from N.N.W. to W.S.W., running at the time 11½ knots. The change of water supplied evidence that some great change had taken place, as after encountering the Agulhas Current the water turned quite smooth, and quite a hot air rushed up the weather side of the vessel. Had the current any influence on the sudden shift of wind?

Captain Quirk, *Sebastian Chabot*, February 13th, 1850, lat. 39° 25' S., long. 16° 30' E. Water rose from 57°.3 to 73°, with a very boisterous troubled sea.

Captain Turnbull, *Glen Clune*, March 26th, 1860, lat. 42° 14' S., long. 11° 16' E. I suppose that the cold water of 52°, flowing easterly, comes from the S.W., and that part of the increase of temperature is due to the off-shoot of the Cape Current, which stretches south-westerly from Algoa Bay.

Captain Bowlby, *Charles Holmes*, July 26th, 1855, 9 a.m., position 38° 46' S., long. 15° 4' E.; temperature of the water 53°; rose at noon, position 38° 49' S., 15° 36' E., to 62°.5. How are we to account for this immense rise in the temperature of the water? The air and weather still continues the same. The change was quite perceptible to the hand.

Captain Campbell, *Storm Cloud*, July 31st, 1855, 40° 8' S., 10° 42' E., at 8^h 30^m a.m., passed through some heavy tide rips, in which the sea broke very heavily. The temperature rose to 53°; immediately after crossing the edge it fell to 49°, as before.

Captain Smith, *Fort George*, August 30th, 1856. At 8 a.m., position 40° 40' S., 17° 44' E., temperature of water 48°; at 3 p.m., 40° 57' S., 19° 30' E., temperature of the water 63°. At noon saw the appearance of broken water close under the bows, ship going nine knots immediately crossed through it, and although going so fast she went off 3 or 4 points to the North against her helm. After passing the water was as smooth as a duck pond, and as far as the eye could reach astern, in a N.E. and S.W. direction appeared a line of broken water. The warm water was of a dark brown colour, on the opposite side of the stream the water was dark blue.

Captain Toynbee, *Marlborough*, September 3rd, 1860, 39° 24' S., 13° 23' E., 6 a.m., temperature of water, 52°.8. September 4th, noon, 39° 3' S., 18° 51' E., water 66°.2. These sudden changes from warm to cold water, and *vice versa*, have a great effect on the wind and weather. The current having an easterly tendency seems to say that the warm water from the Mozambique has extended thus far, and is recurving to the eastward, the result of its coming from a low to a high latitude. The sudden changes in the temperature of the sea show clearly that the hot and cold waters are connected by a toothed margin, the one tooth being hot, the next cold water. It would be interesting to know if the easterly current prevails in both. At noon, on September 4th, sea very confused, caused, I suppose, by the rush of warm water into these colder regions.

The Tracks, Winds, and Weather, over the Bank of Agulhas, are described hereafter.

2.—The South African Current.

(168.) The SOUTH AFRICAN CURRENT sets, as already noticed, along the western coast of Africa toward the Equator, where it is connected with the equatorial stream. On the parallels of Angola and the River Congo it exists as a powerful and very extensive stream, setting to the north-westward and westward, along the Equator, whilst the *Guinea Current*, from the North Atlantic, meeting it, passes *within*, and nearly brushes in its way to the Bight of Biafra, where it terminates, being barred up by the lands to the eastward, as described in our North Atlantic Memoir.

(169.) The South African Current is analogous to the Peruvian or Humboldt's Current, which runs to the northward along the West coast of South America. The Peruvian Current is a prolongation of the Antarctic easterly drift (the equivalent to the Southern Connecting Current in the Ethiopic), but which is there intercepted to a greater degree by the greater southerly projection of the American continent. With this exception, the features of the two currents are similar, and they supply similar places in the circulation of the two oceans.

(170.) Captain Toynbee writes:—

The water on the Agulhas Bank and in Table Bay is remarkably cold, showing that its source is not the Mozambique Current. Laying at anchor in

Table Bay in February (the corresponding month to our August), we found the water down to 51° (the same temperature as we found at the entrance of the English Channel in March), when the day before we entered the bay, in lat. 35° 16′ and long. 22° 54′ E., it was 70·5°; and four days before, in lat. 33° 15′ S. and long. 30° 40′ E., it was 78·3°. Again, after running 90 miles due West from Table Bay, the temperature of the sea rose 19°. We may naturally conclude that Table Bay gets cold water from this ice-bearing sea, and that the same water runs northward along the West coast of Africa, and forms the South Equatorial Current, and is also one of the causes of the dampness from which the West coast of Africa suffers. No doubt the inhabitants of Cape Town are benefited by the cold water of Table Bay in several ways; one may leave the town overcome with heat, and find the temperature of an English March on board a ship at anchor in the bay. They may also thank it for the abundance of fish which may be had just for the taking. When lying there in February this year, my crew were hauling in large crawfish almost as quickly as they chose, and the fishermen of the place beating about were catching snook (*Thyrsites Atun*) in the same profusion, making the whole bay a scene of most picturesque and enlivening interest.

One can scarcely avoid contrasting the climates of Natal and Cape Town. The former abounds in tropical productions which will not grow at all in the latter. No doubt the cause of this is, that Natal has a current of a temperature of 78° running by it all the year round, while Cape Town is surrounded with a cushion of cold water down to 51° in the height of summer.

(171.) Till recently, we have not many direct observations for the temperature of the sea on the West Coast of Africa to the northward of the Cape. Captain Maury's charts are a blank hereabout; therefore this direct proof of the origin of the current is here wanting. But inferentially its course may be affirmed with certainty. It has been noticed before that the water in Walvisch Bay, nearly under the tropic, is so cold as to be almost unpleasant for bathing, and we know that the northerly current is very persistent thus far.

(172.) There is another evidence from the sea temperature. The lines of equal temperature (isothermal lines) as that of 70° Fahrenheit, do not follow the same parallels, or run East and West as might be theoretically supposed, but from the Cape of Good Hope they assume a general N.W. direction, having cooler water to the eastward. The effects of this current may also be traced in the contour of the sand-banks and peninsulas on this coast of Africa. They all trend to the N.W. from the general line of the shore.

(173.) Of its rate or extent we are also in some doubt, but that it reaches the southern limits of the Bight of Biafra, as before stated, there can be little doubt, and its western margin is very undefined, as it merges gradually into the great western drift impelled by the S.E. trade winds, assuming the general direction of that great aerial current, while the surface-waters eastward of the line joining the Cape of Good Hope and Cape Verde [see (22), on p. 41, &c.] are impelled to the northward and toward the land by the African monsoon.

(174.) Commander E. G. Bourke, R.N., makes the following remarks on this current: Another current of even colder water, which apparently comes from the S.W. of the Cape of Good Hope, runs to the northward along the

West coast of South Africa. This, like the one off Cape Verde, is very cold close to the shore; it however prevails throughout the year as far as Cape Frio (lat. 18° S.). Table Bay is filled with it; in January (midsummer) its temperature there was only 52°, whereas in False Bay (which usually contains warm water coming from the East) the temperature of the sea was 67°. A strong N.W. gale often drives the cold water round the Cape of Good Hope, or blows the warm water away from the shore, when the cold, if near at hand, rises to replace it. In Simon's Bay the temperature of the sea falls 15° during a N.W. gale. In May, I found the water 20 miles to the westward of the Cape of Good Hope to be 65°, when in Simon's Bay with a N.W. wind it was only 51°. Proceeding in that month to the N.W. from Table Bay this cold water is found all along the coast; off Cape Frio its temperature was only 56°, the air, cooled by the sea, was almost saturated, and heavy mists hung over the water, when, at the same time, it could be distinctly seen that over the land the sun was shining brilliantly in a cloudless sky, and an observer on the shore (which was here a sandy desert) would probably have seen a fog-bank to seaward; very heavy dew prevailed all night. At this season (May), this cold water does not extend much to the northward of Cape Frio (18° S.), but the current continues to run to the N.W. until it approaches the Equator, when it changes its course to the westward, and is then known as the Equatorial Current. During the southern winter (June to September), the cold water appears to extend from the Cape of Good Hope to the Equator, and thence as far as 30° W.; it is then very cold. I crossed it twice in July, 1873, in proceeding from the Gold Coast to Ascension and back, in lat. 0° to 2° S., long. 5° to 9° W., and found its temperature down to 70°, the water to the northward being at 80°, and that to the southward at 79°; the strength of the current between these points was from 30 to 45 miles a day, the mean direction being W.N.W. true. This cold water was green, the weather being fine, but cool and misty, with much dew at night.

In May the Equatorial Current is much warmer: at the island of Anno Bom, lat. 1° S., long. 5° E., its temperature in that month was 85°, and the current was running N.W. by W., at a rate of 1½ knot an hour. But the most remarkable feature of this N.W. current from the Cape of Good Hope is the sudden manner in which its cold waters simultaneously appear along the land to the northward of Cape Frio; for instance, at Little Fish Bay (15° S.) early in June, it was only 61°, on leaving which and steering due West the temperature rose until it reached 71° at the island of St. Helena; again in the harbour of St. Paul de Loanda, about June 20th, 1865, the temperature of the water fell in a few days from 73° to 66°. In August, 1866, this cold water was found in Kabenda Bay (lat. 5° S.), to reach which it must have passed under the warm and rapid stream of the River Congo, whose waters were 10° higher. This cold water leaves the coast between lat. 0° and 15° in September. . . . . . . The cold water found on the Equator from July to September, and which extends to long. 25° W., is doubtless a continuation of this N.W. current; and though I have no observations to show that the water is so remarkably cold between 12° and 2° S., still I feel sure that it is so there during those months.—*Journal of the Meteorological Society*, Vol. IV., 1878, pp. 29—30.

3. –The Guinea Current.

(175.) This singular current, the origin of which does not appear to have been properly explained till recently, is a band of current setting to the *eastward*, against the usual course of the trade wind and tropical drifts, along the Guinea Coast, quite up to the Bight of Biafra. It has been shown in our North and South Pacific Directories that there exists a similar current, which runs across the entire breadth of the great ocean, between lat. 4° and 10° N. of the Equator, almost or quite up to the Bay of Panama. From the fact of this *counter current* being to the North of the Equator, or in the zone where the N.E. and S.E. trade winds meet and neutralize each other, it is fair to infer that it is formed by similar causes; the drifts from each trade wind here meeting and forcing the waters to return upon their previous set. That Major Rennell's supposition, that this is a prolongation of the set down the coast of Morocco, &c., is not the correct one, may be inferred from his own charts and other observations (see those of Baron Roussin, given hereafter), and is of the same nature as the Pacific Counter Current.

(176.) As this current more particularly belongs to the North Atlantic, it is described at greater length in our Directory for that ocean, and numerous examples are there given of its having been met with on the western side of the ocean off the North coast of Brasil, and from this it is traced across to the eastward to that part where its existence and character have been long known.

(177.) It is needless here to quote all that is there said, but it may be briefly stated to occupy, with more or less regularity, all the space which lies between the N.E. and S.E. trade winds, as described on page 48, &c., ante, and thus to aid vessels which cross the Equator on the western meridians, from being drifted too far to the westward to clear Cape San Roque.

(178.) One of the most remarkable examples of this easterly current recorded, and one which unmistakably demonstrates its existence and activity, was encountered by John Alexander Mann, Esq., F.R.G.S and F.R.A.S.* He left Cayenne in French Guiana, in the brigantine *Monte Christo*, 120 tons, bound for Paranahyba, on July 26, 1862, the day of the new moon, the wind blowing from the East. A direct northerly course was steered until the 30th, when the ship was in 7° N., and the log, by dead reckoning, was the same as Cayenne, i.e. 52° 14′. On August 7th, spoke the Austrian brig *Rarita*, which gave longitude 27° 14′; that of the dead reckoning of the *Monte Christo* gave 42° 14′, so that the vessel had been drifted *nine hundred miles* to the eastward, and for eight consecutive days she had been drifted 3½ knots an hour to the E.S.E. There was a great doubt as to the accuracy of the longitude, but at noon of the 15th, in lat. 0° 45′ S., they spoke a Dutch brig, which gave the longitude as 27° 8′, while the D.R. placed them in 44° 0′, which, compared with the position on the 7th, shows that they were drifted 120 miles farther to the eastward. In fact, had the ship been left to the current, it would have soon reached the African coast, having drifted 1,020 miles in 20 days.

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* See Proceedings of the Royal Geographical Society, Vol. VII., 1863, pp. 50, 51.

Throughout the remainder of the voyage, which lasted 14 days longer, the same current was experienced. The Captain of the *Loyal*, which arrived some days after, abandoned his chronometer from the same cause, believing it to be out of order. Afterwards, in sailing from Surinam to Cayenne, in the *Alecton*, French man-of-war steamer, Mr. Mann met with the same phenomenon.

(179.) These facts are very important, in connection with the westerly crossing of the Equator, now strenuously advocated, and the influence of this powerful current, which appears to have much constancy during the northern summer months, may have much to do with the readiness with which vessels, having reached too far to the westward, contrive to weather the eastern extremity of Brasil. This will be adverted to hereafter.

(180.) In a subsequent part of this book, that devoted to discussing the best medium for crossing the Equator, we give the result of an exhaustive inquiry into that portion of this current, with other meteorological facts which are encountered in the square limited by the meridians 10° and 40° W., and lat. 20° N. and 10° S., embracing nine 10° squares of the Meteorological Office. In that part will be found a more exact description of its extent and velocity; but we may here give the conclusion that Captain Toynbee has arrived at in pursuing this investigation.

It will be seen that, although the trade winds which produce the westerly currents of water are chiefly north-easterly and south-easterly, the currents themselves are chiefly westerly. Now it is known that the air composing the trades which meet in the doldrums, rises, and passes away as an upper current, but the water which they drive before them, as well as that which falls so abundantly in the doldrums as rain, cannot rise like the air, excepting the very small quantity lifted by evaporation in this cloudy rainy part, so that it must be heaped and form a ridge of water in the doldrums, which ridge would naturally divert the water flowing towards it into a more westerly direction than that of the air which drove it. From this ridge the easterly current, so frequently mentioned in this paper, seems to run as a back-drift, when the pressure of a following wind ceases. The outline of the Coast of Africa, considered in connection with the north-westerly current caused by the S.E. trade, accounts for the back-drift into the Gulf of Guinea; for the tendency of the above-named current is to draw water out of the Gulf, just as blowing at right angles across the mouth of a tube full of liquid draws it out, the result being that the water in the Gulf is at a lower level than that to the westward of it, where the tendency of the two trades is to heap water; consequently, as soon as the two currents meet in the calm of the doldrums, the water is free to act under the influence of gravitation only, and flows to the eastward into the Gulf of Guinea."*

(181.) The easterly current thus passing across the Atlantic, strikes the coast of Africa about Sierra Leone and the coast of Liberia. Of course, when near the shore, it assumes its direction to the S.E., and runs with great velocity. As is shown by the Chart of the Currents in our North Atlantic Memoir, its mean annual velocity is between 14·1 miles and 26·5 miles per day, strongest in the summer months.

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* It seems quite clear that if the N.E. and S.E. trades draw the sea away from Africa, and if other water cannot come from the westward, there must somewhere be a back-drift to the eastward.

The large amount of current ripplings in SQUARE 3, seems to be caused by this diverting of the currents out of the directions in which the winds would drive them, if the winds of the two trades did not meet and heap the water.

Its mean direction off Cape Palmas and Cape Coast Castle is E. 12° N., and its calculated velocity from Major Rennell's and Maury's observations is—for January, 17·4 miles to 27·6 miles; February, 26 miles to 32 miles; April, 11·5 miles to 33·7 miles; May, 22·7 miles to 36 miles; June, 30 miles; July, 18·2 miles; August, 15·7 miles to 26·4 miles per day. These are from the records of 75 observations.

(182.) Its southern edge appears to be in about 2½° to 2° N. up to the head of the Bight, and as the southern streams set in an opposite direction, they are serviceable in making a return passage as presently explained.

The temperature of the Guinea Current is high, and demonstrates its equatorial origin, although the branch of it which comes from the northward past Cape Verde has probably a lower temperature as coming from a higher latitude. The South Equatorial Current to the southward of the Guinea Current is also of a lower temperature, coming direct along the African coast from the southern polar regions. The mean summer temperature is about 78°, but in our winter and autumn months it is higher, being from 82·6° to 83° as a mean, and sometimes it is found higher than this.

(183.) At the distance of about 180 miles South of Cape Palmas (long. 7¾° W.) the outer border of the Guinea Current sets to the East, and the same direction of it continues to a similar distance South of Cape Three Points (long. 2° W.); we thence, at 2° North of the Line, find it take a more northerly course, toward the Bight of Benin and the Bight of Biafra; in the latter it mixes with the waters of the *South African Current*, which, coming from the South, set thence to the North and N.W., and, both uniting, form a head in the bight. From this bight, and southward of the Equator, the currents thus blended set to the S.W., W.N.W., and N.W., in one expanding and united stream, which greatly facilitates the passage of ships from Fernando Po to Sierra Leone.

Near *Cape Mount* the current, in general, sets in upon the shore, and on the West of Cape Palmas, about a point from the shore, running with considerable violence round the Cape. The general direction between Cape Palmas and Bonny, or the Bight of Biafra, is easterly, varying in velocity from 12 miles in twenty-four hours to 30 miles in the same time. From April to September the current runs with the greatest rapidity to the eastward; but, from the latter end of September to March, it sets occasionally to the westward. The Harmattan Wind is also accompanied by a westerly current, and a tornado gives an impulse to the water in the same direction, which frequently continues during a day or two afterwards. In the Bight of Biafra the easterly current is met by that from the southward, as noticed on page 113; the united streams then run to the S.W. and westward, as explained in the "North Atlantic Memoir," 14th edition, page 343, and which southern tendency is subject to considerable variation, from the effect of the periodical winds, &c.

(184.) Lieutenant Brito de Capello, of the Portuguese Navy, whose observations on the winds on the African coast are previously given, also extended his enquiries into the nature of the currents. From the same work we extract the following on our present subject.

In *December*, *January*, and *February*, the Guinea Current is felt as far as 23 or 25° W., and farther; and runs to East and E.N.E. between the parallels of 3° and 5° N., joining the current which comes down from the northward along the African coast. Its axis, or the portion where it is strongest and most regular as far as Cape Palmas, is between 3° and 4° N. Its southern limit runs from 3° N. on the meridian of 24° W. to 2° N. on 2° E. Its velocity is then about 1 knot, rarely reaching 1½ mile per hour. To the West of the islands of St. Thomas and Anno Bom there seems to be a whirl or conflict between it and the South African current, meeting it from the southward. Near the coast, between Cape Lopez and the mouth of the Congo, there is frequently a counter current.

(185.) To the South of Cape Lopez, and at a considerable distance from the coast, the water frequently sets to the South, S.E., or East, and Lieut. Brito de Capello examined into 138 instances of this, and found that the abnormal set of the stream is dependant on the moon's age. From the last quarter to new moon there were 49 instances; from new moon to first quarter 36; from first quarter to full moon only 17; from full moon to last quarter 36 occasions. This reverse current then gradually increases from the full moon to the last quarter, and attains its maximum in the three days which follow the last quarter, then diminishes, and afterwards attains a second maximum about the time of the new moon. There is, therefore, evidently some connection between the tides and this reverse of the usual current.

(186.) In *March* and *April* the Guinea Current is less regular and powerful than earlier in the year. In *May* and *June* the Equatorial Current is at its maximum strength and greatest regularity in the neighbourhood of the Guinea Current, which is irregular and uncertain at this period, but is usually met with between the parallel of 3° or 4° to 7° or 8° North. In *July*, *August*, and *September*, the Guinea Current is increasing, and sets, in its western part, to N.E. and East, or toward the land. Its southern edge is very well defined by a line passing from 5° N. in 28° W., to the meridian of 5° W. on 1° 30′ N., which also divides it from the Equatorial Current. Its rate is usually 1 mile per hour. Near Cape Palmas, where it is more regular, its mean rate is 1½ mile. In *October* and *November* the different currents are most irregular in these parts. The North African Current, when it reaches the latitudes of 9° or 10° N., runs to South and S.S.W., but is much complicated by variable counter currents. The Guinea Current, which is found South of 8° or 9° N., runs generally to N.E. and E.N.E., but is not well defined westward of 24° W. Its southern edge is much more southward in the Gulf of Guinea, and its velocity is about the same as at other periods.

(187.) This is all that need be said on this peculiar current, which has such great influence on the navigation of the West coast of Africa, as it is shown hereafter. The illustrative charts will afford further information.

Information on this current compiled from the Board of Trade Monthly Analysis, 1872, and Capt. Toynbee's work on the Meteorology of the area included between lat. 20° N. and 10° S., and long. 10° and 40° W., will be found in the "North Atlantic Memoir," 14th edition, pp. 344—347.

4.—The South Equatorial Current.

(188.) The great tropical drift, caused chiefly by the S.E. trade wind, is not well distinguished by the usual term of the "Equatorial Current," which more properly belongs to that just described as lying on the (meteorological) Equator. According to the usual definition, it is that great moving mass of waters which is limited on the North by the Guinea Current, and on the South by the Antarctic Drift Current, having in fact the same area as that occupied by the S.E. trade wind, and in some degree obeying the same laws.

(189.) On the eastern side it commences with the South African current, that northern stream which sets up the West Coast of Africa as far as Cape Lopez and the Bight of Biafra, the western edge of which is not well defined, but merges gradually from its North and N.N.W. direction to a more westerly course.

(190.) In mid-ocean, where its rate and persistence are the most marked, it may be always reckoned on, and its mean velocity will be found varying from 10 to 15 or 20 miles per diem. Sometimes it is greater than this. In its northern part its rate is greater, sometimes attaining 1½ to 2 knots per hour. Its southern limit is very undefined in mid-ocean, both from want of collected observations as from its uncertainty, but more will be said on this when the Antarctic Currents are treated of.

(191.) Arrived on the American side, this great drift becomes subject to the modifications caused by the wind of the coasts it impinges on. In the northern part it sets strongly past the N.E. point of Brasil, and along its northern coast, and is considerably altered, varying with the seasons, as it passes down the eastern coast.

(192.) As this part of the ocean is very important to navigation, since a more westerly crossing of the Equator, in passing from the North to South, has been adopted, it is very desirable that it should be properly understood. Capt. Maury has especially insisted that there is no danger of being horsed to leeward of Cape San Roque by westward currents with a well handled ship.

(193.) He says: At any rate, if the worst comes to the worst, and you have to go into a dead beat, you might as well undertake it near St. Roque as in mid-ocean, for I refer each navigator, not to tradition, but to his own experience, and to the hundreds of abstracts that have been quoted in this and previous editions of this work, to sustain me in the assurance that there is no current between the line and St. Roque which any seaman who knows what to do with his ship, and who has a ship worthy of him, need fear. Still, notwithstanding all this array of facts, notwithstanding, we challenge any navigator to give us any authority or evidence in favour of *dangerous* currents about St. Roque beyond the alarm raised by hydrographers, because some English transports were wrecked there in the last century: I say, notwithstanding the shipmasters cannot adduce any proof in favour of these terrible currents, the belief in them is so common and deep-seated in the minds of mariners, that many, as the abstracts I have quoted will show, are in fear and trembling of these currents of fabulous power when they find themselves on the Equator as far West as 30° or 31°. The fear which seamen have been taught to entertain of St. Roque and its currents remind one of the dread with which the ancient mariners regarded the Sirens; and all that is wanted to break this modern spell is the daring of Ulysses.

An English transport of the last century could not sail over 5 knots, with a favourable wind, at best; and what could she do in turning to windward anywhere in a sea-way, whether there was any current or not? Of course, if such a vessel fell to leeward of St. Roque, she was back-strapped with a vengeance. She never could get round. But this is not the case with modern ships. Between the line and St. Roque a current of 1 or 2 knots to the northward and westward is sometimes met with. But what is such a current to a long-legged ship of the present day?

(194.) This and other similar remarks have been apt to throw the mariner off his guard as to the velocity of the Equatorial Current here, and therefore we repeat what has been given in former editions, that in the vicinity of Fernando Noronha and St. Paul's Rocks, it has been found to run at 2½ miles an hour, and that off the N.E. projection of Brasil a still greater rate prevails at times.

From disregarding the silent effects of this westerly drift, many sad wrecks have probably occurred of late years, for, during the late surveys, the remains of many were found on Las Rocas. One especially deserves notice, that of the *Duncan Dunbar*, a fine ship of 1,300 tons, which was drifted on to that treacherous coral reef, on the night of October 7th, 1865, becoming a total wreck, but the lives of her 117 crew and passengers were saved.

(195.) From some remarks which were publicly made at that time, the Hydrographic Office issued the following:—

As many recent navigators have in practice adopted a more westerly route for crossing the Equator than prevailed in former years, it appears desirable that the facts accumulated as to the general correctness of the foregoing description, and especially as to the direction and strength of the currents in the vicinity of the Rocas and Cape St. Roque, should be brought to the notice of seamen briefly and clearly.

The East India ship *Britannia*, and *King George*, transport, were wrecked on the Rocas at 4 a.m., November 2nd, 1805, when the current set at the rate of 2½ knots to the eastward.—*Brasil Pilot*, 1818, page 31.

Lieutenant-Commander Lee, in the U.S. brig *Dolphin*, was employed 14 days in March, 1851, sounding near and surveying the Rocas and their vicinity. He states, "the current in the vicinity of this reef sets from between S.E. by E. and E. by N., at the rate of from ⅞ to 1½ knots per hour. The surface current found by trials on four different days sets from between S.E. and E. by N. from ⅞ to 1½ knots per hour. At our anchorage under the lee of Sand Island, the tide ran from ¼ to ⅞ knot per hour, setting from between S.S.E. and E. by N. towards the northward and westward;" also, "the current between the Rocas and the Main sets generally from the southward and eastward from 1 to 1½ knots."

In March, 1856, H.M.S. *Sharpshooter*, Lieutenant-Commander Parish, anchored near the Rocas, and at the suggestion of the British Consul at Pernambuco, planted several cocoa-nut trees, only one of which was remaining in 1870. In this officer's remarks he states, "We found the current to set W.N.W., true, between 1 and 2 miles per hour."

On the 12th of November, 1856, in the afternoon, the ship *True Briton*, in passing the Rocas, and observing signals of distress on the shore, endeavoured to communicate and render assistance by boat, but from the strength of the current was unable to do so from the ship being swept to leeward so fast. On the 13th of November, it is stated, "found that the ship during the last 24 hours had been set to the westward 60 miles. On the 14th of November, find that the ship has been set to the westward 36 miles during the last 24 hours."

In 1858, Commander J. H. Selwyn, in H.M.S. *Siren*, visited the Rocas, and erected a temporary beacon. He states that the "anchorage is fair, and protected from the prevalent swell from N.E. to S.E.," and, "from its situation in the heart of a westerly current, which varies in force from 1 to 2 miles, and its comparative vicinity to the mainland, a lighthouse would be most valuable to the mariner, as a means of ascertaining his position with certainty." A lighthouse is now in course of construction on these rocks.

Numerous other isolated examples of the westerly current prevailing near this reef will be found in published works; but the following analysis of the registers of 930 ships, which have been deposited with the Meteorological Department of the Board of Trade, between 1856 and 1865, will doubtless be deemed sufficient.

Of these 930 ships passing from the North to the South Atlantic Ocean, 42 passed within a distance of 30 to 40 miles East or West of the Rocas at various seasons of the year. Of these forty-two, fourteen do not record whether they have experienced any current or not. One experiences "a strong westerly current," and was "driven back." The remaining twenty-seven found currents of the following direction and rate.

11 vessels were set West:—4 of these from 48 to 24 miles, and the remaining 7 from 20 to 10 miles a day.
8 „ W.N.W.:—4 of these from 51 to 30 miles, and 4 from 29 to 21 miles a day.
5 „ W.S.W.:—3 of these from 48 to 30 miles, and 2 from 20 to 10 miles a day.
1 „ S.W.:—40 miles a day.
2 „ North:—42 to 8 miles a day.

The strongest of these twenty-seven recorded currents were found in June, July, August, and November.

5.—The Brasilian Currents.

(196.) On the Eastern Coast of Brasil the Stream Currents, formed as already noticed, are varied according to the direction of the winds or monsoons, and the inclination of the coast. The Baron Roussin says, "As the winds do not impede the navigation of these coasts, neither do the currents; they generally follow the winds, according to their force and direction; for there is no river between Maranham and the Isle of St. Catherine powerful enough at its mouth to carry with it any sensible motion into the sea to more than 1 or 2 leagues from the coast. The winds are variable, so are the currents; their change is very quick. In these warm seas the waters are very clear, and they are disturbed by the first impulse given them. At the end of twenty-four hours, if the breeze be strong, you may observe a current running in the same direction. After a great number of observations on the currents, we have estimated, more or less, their velocity along the coast, from the Island of St. Catherine to Pernambuco, at six-tenths of a mile an hour in the two monsoons; it is often under that quantity, rarely above it, sometimes nothing. The velocity of the currents is more considerable in the southern monsoon than in the northern, because the wind is stronger in the first instance than in the other.

"But the velocity varies on different parts of the coast. Between the parallel of the Island of St. Catherine and that of the Abrolhos, or 18° S., and from 6 to 30 miles from land, the current is hardly to be discerned in any season. From the 18th to the 11th degree the waters carry you to the N.W. during the southern monsoon. From the 11th to the 9th degree, in proceeding northward, the waters carry you to the northward with greater velocity, which increases at times to the rate of 36 miles in the twenty-four hours, and is seldom less than 20 miles. To the N.W. of Cape St. Roque it sometimes sets at the rate of 48 miles per day, the waters running W.N.W. in the direction of the coast.

"On passing Pernambuco, and in following the land to the northward, the currents and monsoons can rarely have any influence of consequence to navigation. More to the southward their effect is greater, and they may be considered as tides; these, again, are not important, as they do not extend far from land, and only affect vessels going to the small ports or creeks on the coast. Most of the great ports are subject to the regular tides.

"Adverting to what has been said on the winds and currents off the coast of Brasil, we must conclude, first, that between the Isle of St. Catherine and Olinda, or Pernambuco, there is no permanent obstacle against navigation; and the recommendation to make the land to windward of the place you are going to, is a matter of precaution to preserve yourself from all disappointment. Secondly, from the Point of Olinda, all along to Cape St. Roque, and thence to the Isle of Maranham, prudence dictates that you should keep to the eastward of the point you would arrive at, after compensating in the track the effect of the currents carrying you to the W.N.W."

(197.) Captain Hewett says, "During the southerly monsoon the currents to the southward of Cape St. Augustin are not so powerful as to the northward, where they increase in strength until the months of June and July, and then gradually decline. On the contrary, in the northerly monsoon they are generally very strong to the southward of Cape St. Augustin, when they are weak to the northward, as they have some difficulty in detaching themselves from the stream which runs from the S.E. trade around Cape St. Roque."

Mr Lindley also notices that " A strong current runs southward from Cape St. Augustin, commencing about the middle of October, and continuing until January; after which there is no particular current till the middle of April, when a powerful one sets in northerly till July, and then subsides in like manner."

The southern tendency of the current was felt in proceeding from Fernando Noronha to Bahia, by Captain FitzRoy, who says, " From the 23rd to the 27th of February, 1832, we found a current setting to the southward, between 20 and 30 miles each day. This was quite unexpected by me, for I thought we should have been set westward."

(198.) Captain Mouchez, who surveyed and examined the coast between Bahia and the River Plate, whose observations on the winds have been previously given (pages 57, 58), gives the following summary:—

At 120 or 150 miles off the coast of Brasil the current generally descends, parallel with the coast, from N.N.E. to S.S.W., and is the southern branch of the great South Equatorial Current which bifurcates on Cape San Roque. It has a mean velocity of 20 to 15 miles in the 24 hours, and loses its force as it progresses southward, and besides it varies with the seasons and force of the wind. It is scarcely sensible beyond the tropic, or the parallel of Rio Janeiro. Combined with the drift of the S.E. trade wind, it frequently sets toward the land to the S.W. or W.S.W.

(199.) Between this current and the land, the movement of the surface-waters is entirely dependant on the wind; if it blows twenty-four hours in the same direction, either N.E. or S.W., the current sets in with proportionate strength. Thus, during the N.E. winds, especially between October and January, the current sets to the S.W. with a velocity frequently reaching 25 or 30 miles per day. The velocity is greatest near the projecting points, such as Cape St. Augustin, the Rio Doce, Capes San Thomé and Frio, &c. Vessels at this season, making the land at Pernambuco or Bahia, should reckon on a drift of a mile an hour, and act accordingly. Many ships have been drifted 36 to 40 miles to the S.W. in the twenty-four hours.

(200.) But these currents cease with the cause which produced them, and do not offer that permanent obstacle that is met with on the northern coast, from the continued drift to the westward that is encountered there. With the exception of the three or four months of summer, November, December, and January, when the N.E. winds are in full strength, the currents are weak and variable. During the S.W. monsoon they are equally feeble to the northward. They are strongest in June and July.

(201.) Near the land, and under the lee of some of the headlands, as to the southward of Capes San Thomé and Frio, there are counter-currents to the N.E., although at a few leagues outside they run strongly to the S.W. This is sufficiently explained by the relative direction and form of the land. Along the coast of Pernambuco near the land there is frequently a strong northerly counter-current, which makes it difficult for a vessel to hold her own, if overtaken by calm when nearing the land.

(202.) It is therefore manifest that, with few exceptions, the currents do not offer any very serious difficulties to navigating in any direction on these portions of the Brasilian coasts.

(203.) At *Cape San Roque*, and along the North coast of Brasil in its vicinity, the current sets to the N.W. and West, at from 20 to 60 miles per day, between March and September, but during the other part of the year at much less velocity. Some further notices on this will be found hereafter.

6.—The Southern Connecting Current.

After the Brasilian current has reached the parallel of the Tropic of Capricorn in its southward course, it is influenced by the variable and westerly winds, which have been termed the "calms" of Capricorn; and the waters, obedient to their impulse, gradually assume a more easterly direction, and blending on their southern edge with the Antarctic drift, they form that connecting link in the circulation of the surface waters of the South Atlantic, which is in some degree analogous to that which is seen in the other oceans, especially in the North Atlantic and North Pacific, where the waters pass gradually around the area, leaving a space in the centre of comparatively still waters. This southern branch of the circulation in the South Atlantic was termed by Major Rennell from this cause, the Southern Connecting Current. But this is, perhaps, scarcely definite, for the westerly drift of the antarctic waters unite to form this compensative movement of the water.

This current flows eastward over the ocean between the variable drifts, &c., in the parallel of 40° S., and the S.E. trade wind, commencing in that of 25°. Major Rennell accounts for it thus: "From between 20° and 25° S. to the verge of the trade wind, the drift current on the West side of the Atlantic takes a bend to the southward through the whole space, generally, from the coast of Brasil to 17° of longitude East from it, or about 300 leagues, which may probably be accounted for from the quantity of drift impelled to the westward by the trade wind, and which cannot reach the coast from want of room, and can escape no other way. This accumulated water, passing to the South beyond the limits of the trade wind, and consequently of the western drift, runs off to the eastward, and is consequently augmented in its way by the prevailing *westerly* winds, and by drift bending southward, becomes a large stream before its arrival at the neighbourhood of the Cape of Good Hope."

This is a part of the ocean but imperfectly known; so that, generally, between 30° and 40° of latitude, and longitudes 35° and 40° West, is nearly a blank in the chart. It is, however, known that a constant drift or slow current runs to the East or E.N.E. from the Island of Tristan da Cunha; and, indeed, every circumstance proves that there is a general motion to the East between the parallels of 30° and 40° South, and which, when it approaches the Cape of Good Hope, is a very wide and strong current, strong enough to run 2,000 miles beyond the Cape.

(204.) To the southward of the region of the S.E. trade wind, and extending as far towards the icy barrier as the parallels just adverted to, there is a current running in an easterly direction all round the globe. We have several positive evidences of this apart from the detached observations of ships passing in its influence. These are afforded by current bottles, which have been of so much service in generalizing the circulatory system in the Atlantic. One of these, recorded by Captain Sir James Ross, which travelled around a large portion of the earth's circumference, and was thrown on Cape Liptrap, South Australia, proving indisputably the continuity of the Southern Connecting Current of the South Atlantic with the easterly drifts in the Southern Indian Ocean.

Again, a bottle was picked up on Kangaroo Island, South Australia, in the latter part of 1863, which had been thrown overboard from the Dutch frigate *Prinses Amalia*, in lat. 39° 39′ S., long. 66° 7′ E. (or about 300 miles North of Kerguelen Land), fifteen months previously. The distance travelled was about 4,000 miles, giving a rate of 9·1 miles per day.

Another bottle has formed an important link in the connection of the currents, like that quoted by Sir James Ross, by crossing a part of the ocean between Cape Horn and the Cape of Good Hope, a space almost unknown and untraversed by commerce. It was thrown overboard by Captain Tobin, from the ship *Ocean Chief*, in lat. 42° 40′ S., long. 42° 32′ W. (850 miles E.S.E. of the River Plate), in January, 1857. It was picked up at sea by Captain Williams, of the whaler *Gideon Howland*, December 16, 1857, in lat. 39° 50′ S., long. 36° 35′ E., a distance of 3,850 miles in 350 days, at the rate of 11 miles per day.

(205.) These three examples will suffice to show that there is a drift of at least an average of 10 miles a day to the eastward, inclining to North, on the parallel of 40°, as may be derived from theoretical conclusions. The recorded experience of currents by passing ships in these latitudes is unfortunately very scanty, and it may be broadly stated that the maximum easterly drift is in about 43° to 50° S. By keeping between these parallels, a vessel will be benefitted to the greatest amount by their influence. Further to the North it is probable that this drift may gradually merge into the warmer waters of the tropical current, impelled by the trade winds in the same manner as is argued for the gradual absorption of the anti-trades into the regular trade winds. But at the same time it must be stated, as is well known to all sailors, that these drifts are much influenced by the prevalent wind, and that, therefore, a contrary wind will weaken or stop the eastward tendency, as a strong westerly wind may increase its velocity.

It has already been shown that the *Southern Connecting Current* blends with the *Counter Current* from the *Bank of Agulhas.*

7.—The Antarctic Currents.

(206.) For the present work, specially adapted for the services of ordinary navigation, it will be needless to carry the descriptions of the currents and their origin to those high latitudes, far beyond the tracks of commerce. These have only been visited by scientific expeditions specially sent and adapted for these adventures, or by a few hardy seamen who have ventured so far away from the well-frequented paths in search of whales or seals.

(207.) Unlike the other great southern oceans, the South Atlantic has no known great southern limit of land. As far as has been penetrated by Cook, Weddell, Biscoe, Bellingshausen, Ross, &c., where free from the dense masses of ice, it is open ocean. But as the constitution of the southern ice-drift differs from that of the Arctic regions, requiring a land-basis, generally, for its formation, it is fairly to be inferred, that in a higher southern point than has as yet been reached, the solid ice-bound terra-australis would be met with; otherwise the great masses of ice-bergs which are at times met with throughout its whole breadth could not be formed. In the few words which follow, only the general features of the drift which brings these immense formations within the usual routes of the vessels bound round either cape, will be given, and these will be taken from our Directory for the Indian Ocean, as equally applicable to the present subject.

(208.) From a consideration of the observations of these exploratory voyages, which have been taken in the summer season only, we may form some certain deductions, and we have the remarkable feature of the whole, or nearly the whole, of the surface waters in a zone between 55° S. and 65° S., or the margin of the land, setting towards an impenetrable barrier, which, as far as it is at present known, encircles the South pole either in the form of stupendous ice-cliffs, or of lofty mountains descending nearly to the water's edge, without any known passage into an interior basin for the admission of ocean influences into so large a portion of the earth's surface.

(209.) Of course, the impact of this southerly current must have some outlet, but on the surface of the waters this is not appreciated, and it is to the inferior strata of the polar waters that we must look for the necessary compensation. We have all evidence of a *northerly* set in the drifting of the enormous and deeply floating ice-bergs. These vast masses so deeply immersed, can be but little influenced by the wind, and therefore it must be to current that their reaching the low latitudes they are found in must be owing. In very high latitudes, as from 70° to 65°, their progress is but slow. Estimated by Sir James Ross, in some instances at not more than a mile a day; while, with a much lower parallel, Captain Wilkes estimated the progress of the drift at from half a mile to three-quarters of a mile per hour in latitude.

(210.) It is, therefore, probable that their motion is due to an under current, which reverting from the south-easterly set (208) up to the edge of the great barrier, then turns to the North, and afterwards to the N.E. and East, forming a portion of the Southern Connecting Current, and the effects of which are made manifest in the cold currents which are encountered on the western shores of Patagonia and Africa, and perhaps of Australia, setting to the northward along those coasts: the projection of the American and African continents being transverse to its line of direction.

(211.) This north-easterly current is an equivalent to the well-known north-easterly drift which, as is well known, prevails in North latitude, and brings the warmer waters of the tropics to the shores of Europe and America, leaving the opposite or western shores of the ocean in Tartary and Labrador, although in similar latitudes, in a climate very far colder than those under their influence. From the scanty observations we possess, it is manifest that little more can be said of their persistence and velocity than has been stated; but this easterly set may be generally reckoned on by those vessels which may venture into these high latitudes. That it exists throughout the year is manifest, from the fact that no season is entirely free from the presence of floating ice, which indicates this northern sub-surface current, drifting it to the eastward. These ice-drifts will be noticed more at length in the pages following.

8.—ICE.

(212.) In high latitudes one great source of danger and apprehension is the existence of those floating masses which, uncertain in their locality, cannot be guarded against without a zealous look-out; and this is especially the case on the western side in passing round Cape Horn. The nature of the antarctic drift, which transports these vast impediments into the path of commerce, has been just described. A few remarks will follow respecting the origin of the southern icebergs.

(213.) The whole of the southern icy barrier is formed of *land*-ice, and owes nothing to the sea of its enormous magnitude. The perfectly wall-faced cliffs forming their outer margin, are usually from 150 to 210 ft. above the water level, indicating a thickness of over 1,000 ft., and these cliffs extend uninterruptedly for many hundred miles, being approachable in the summer to its foot. " The upper surface of these tabular barriers," says Sir James Ross, " is like an immense plain of frosted silver; gigantic icicles depended from every projecting point of its perpendicular cliffs, proving that it sometimes thaws, which otherwise we could not have believed. In the North, in August, the equivalent month to February, streams of water constantly pour from every iceberg."

(214.) The regularity of their figure must be owing to its being undisturbed by ocean influence during its formation, and to its being free, or comparatively free, from those changes which alternate thawing and freezing would create. These fields of ice must then be formed by deposition on their upper surface only; and as rain is almost or quite unknown, the fogs and snows are the sources of their increase. These depositions being formed on the land, which at a very considerable distance from its outer edge rises into lofty mountains which it is possible, or in some cases probable, consist of ice, and thus, from the weight of their upper strata, form continuous glaciers, and thrust forward those parts which have been formed on and beyond the foot of these mountains, which then being brought within the disruptive powers of the sea are detached, and form the floating bergs. The thickness and density of the antarctic ices will allow of the supposition that they are bodily thrust forward toward the sea, even if the inclination down which they move be very gradual and that the interior portions of the land has by continual accretion obtained sufficient elevation, however vast it may be, to form a seaward slope of sufficient inclination.

(215.) The period required for the deposition of such a mass of ice is a very interesting question. These tabular bergs are all ***stratified horizontally***, in some cases very completely so, by layers of dense and porous or snow-ice. These layers, according to Captain Wilkes, vary from 6 inches to 4 ft. in thickness. Respecting the fall of snow, supposing it to be 1 inch per diem, it would take 30 years to form a mass of the usual thickness. Fogs are also a very efficient aid to their increase, for the same voyager states that his ship and rigging were covered with ice one-fourth of an inch thick in a few hours during a fog.

(216.) It is stated that there is no ***pack-ice*** on the antarctic coast. It would seem that all the vast quantities of floating ice are derived from the degradation of those wall-faced cliffs. This is a very important distinction from the Arctic ices, where the "pack" formed on the surface of the sea during winter, forms by far the largest portion. In the North, when it is broken up, it is in pieces many miles in diameter; in the South these masses are not a mile in circuit.

(217.) These tabular bergs, rising 200 ft. and upwards from the surface, are submerged 800 or 1,000 ft. beneath the sea. Drifted by the northerly (sub-surface) set, they are brought into warmer water, which dissolves their deeply seated bases, which at first are generally covered with boulders and earth, and erodes them into every variety of fantastic form, and thus they ultimately lose their original line of flotation, and roll over in every direction, till at last they disappear as field or pack-ice.

(218.) Their proximity is said to be invariably announced by a fall in the temperature of the sea and air, and it is to this monition chiefly that the sailor must trust for safety during the night or in foggy weather, which too often accompanies their presence. But it is not always that this indication is correct, for when the ice is to leeward both of wind and current, it is manifest that this indication cannot be so well depended on until in close proximity to the danger.

(219.) The late Mr. Towson, so well known for his useful labours in the service of navigation, drew up, in 1859, the most perfect account of the southern ices, and from his paper we extract the following results of his investigations, which later and more extensive inquiries have not impugned.

(220.) From the consideration of the facts collected, Mr. Towson draws the following practical conclusions :—

First.—That the period comprising the months of November and December, 1854, and January, February, March, and April, 1855, was a most extraordinary season for icebergs. In every part of the southern hemisphere South of the fortieth parallel, the number of icebergs met with during these six months was beyond all recorded precedent. We had, during that period, a far greater number reported than the total of every other season from the time of Captain Cook down to the present year. Whether such phenomena are periodical, or that of 1854—55 is an exceptional one, we cannot decide; but from the reports of those who have been engaged in the seal trade, we believe that for 50 years previously there had been no season bearing the least com-

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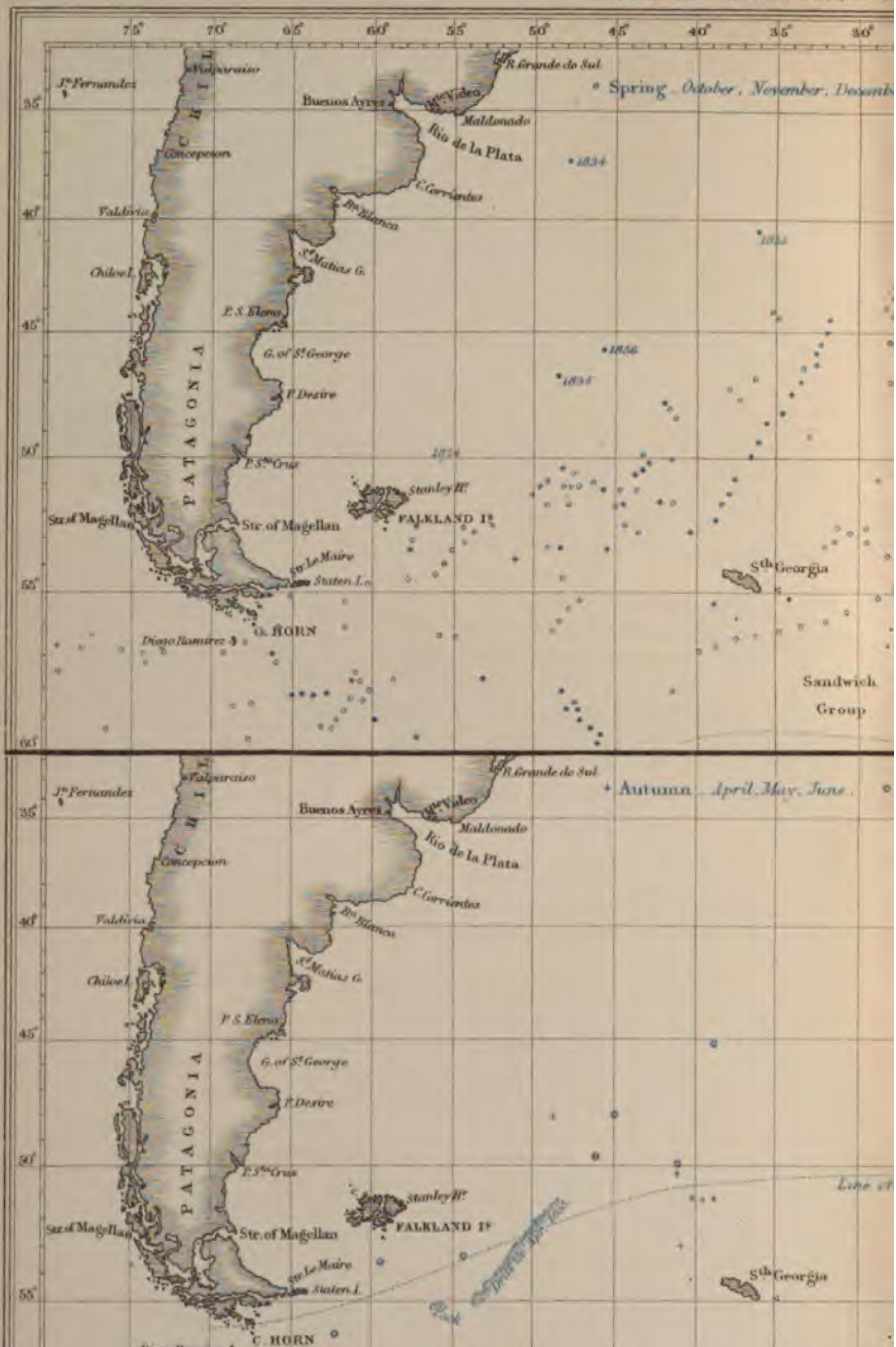
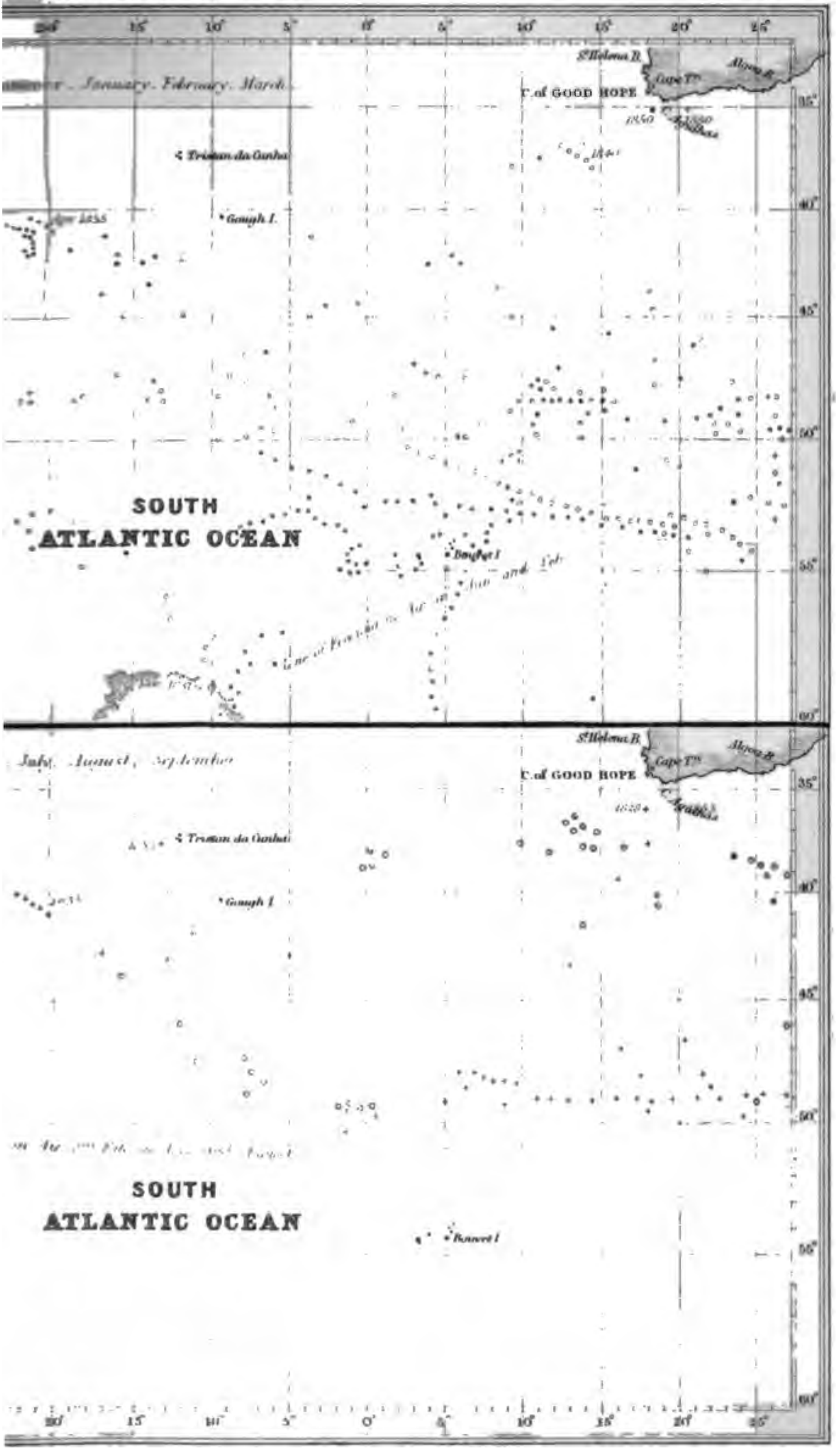


R. H. LAURIE, 53,

REVALENCE OF ICE.

Face p. 128



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parison with the one under consideration. It has been observed that meteorological cycles exist in the southern hemisphere. If there exists a cycle in which such seasons return, the period must be secular. One individual cannot therefore determine this point.

Secondly.—That by far the greatest number of icebergs is met with in the southern hemisphere during the six months of November, December, January, February, March, and April. I have not the record of a single iceberg having been sighted in the midwinter months of June and July, and they have been seldom reported in the months of May and August. And further, that eastward of the Horn there is a space bordering on both the outward and homeward track, which may be regarded as dangerous from ice.

As far, however, as the homeward passage from Australia is affected by the consideration of this locality, it tends only to confirm our previous convictions, and we have more abundant reasons than ever to impress on the mariner the propriety of sighting the Horn and the Falkland Islands on his homeward passage. He has every inducement to follow this track. It is favourable for making a short passage, and it will keep the ship clear from the only locality, adjacent to the passage either out or home, in which real danger exists on account of the ice. I think great sacrifices should be made to follow this part of the route home rigidly, for I have not met with any very extraordinary voyage home made by a ship that has given to the Horn or the Falkland Islands a wide berth. In all cases in which no danger has been experienced from ice, delays have been occasioned, and the passage has been spoiled; nor have I a case on record in which any mariner, following this advice, has met with ice after arriving East of the meridian of 75° W.

(221.) Mr. Towson's valuable labours were afterwards supplemented by a further accession of examples, which were inserted in the "Mercantile Marine Magazine" of 1859. The list was much extended by the addition of all the notices which were received by the Meteorological Department of the Board of Trade, up to the period of the death of its lamented founder, Admiral FitzRoy. From the report issued on this subject, the following table of ice drifts recorded in that office, as having been encountered in the South Atlantic, is selected. It is arranged according to the seasons of the year, commencing with June, the mid-winter month. It is also illustrated by the Chart (page 127), which shows the locality of them.

CATALOGUE OF ICE.

Year.	Latitude.		Longitude.		Description.
	°	′	°	′	
					June.
1856	47	28 S.	37	25 W.	A large iceberg.
					July.
1856	49	42	46	6	A large iceberg, with many small pieces on the South side of it.
					August.
1840	36	10	13	40 E.	Two icebergs.
—	36	38	13	15	Two ice islands.
—	37	32	14	10	An iceberg about 1,000 feet high.
—	38	9	0	10	Many icebergs and fields.
—	38	30	1	0	Four icebergs.
—	40	25	19	0	An iceberg, 300 feet high and 400 feet long.
—	41	30	14	10	An iceberg, 400 feet high and 1,000 feet long.
1854	50	0	41	0 W.	Several icebergs.
—	53	0	47	0	Icebergs.
—	55	0	51	0	Pack ice.
—	56	30	60	0	Pack ice.
					September.
1844	37	8	24	0 E.	Four icebergs, 100 to 200 feet high.
1840	37	0	13	0	An iceberg.
—	37	0	15	0	An iceberg.
—	37	0	15	0	An iceberg, 400 feet high and 1,000 feet long, probably the same as last named.
—	37	30	10	0	An iceberg.
—	37	45	14	50	An iceberg.
1844	38	10	24	0	Many large icebergs, on a surface of 180 miles, S.E. and N.W.
—	39	4	25	50	Many icebergs.
1840	40	20	26	0	One iceberg, 100 feet high, and four smaller ones.
—	40	30	19	0	Two icebergs.
—	41	30	14	10	An iceberg, a mile in circumference.
1854	44	40	15	20 W.	Icebergs.
—	46	0	12	0	A large iceberg.
—	47	30	10	35	Two small icebergs.
—	47	30	10	40	Icebergs.
—	49	34	1	39	Three icebergs.
—	49	40	1 —0	40 W. 20 E.	Numerous icebergs.
1860	53	40	39	43 W.	An iceberg.
—	56	50	63	0	A very large iceberg, 200 feet high and nearly 3 miles long.
1869	45	30	38	40	Passed to East of a large ice island, the extent of which from North to South was about 25 miles. Thirty-one icebergs seen in sailing 140 miles to N. by E. from the position of the ice island. (From Mercantile Mar. Mag., Jan. & Feb. 1870.)
1854	58	0 S.	56	0 W.	An ice-field.
1857	59	0	61	20	Pack ice.
1854	63° to 58°		69° to 72°		Pack ice.

Year.	Latitude.		Longitude.		Description.
					October.
	°	'	°	'	
1840	36	57	13	47 E.	Two large icebergs.
—	38° to 37°		12° to 14°		Five icebergs.
1858	44	50	9	34	A small iceberg.
1856	45	10	28	24 W.	Two icebergs.
—	46	10	33	21	Three icebergs.
—	46	33	36	3	One iceberg.
1858	47	26	10	34 E.	An iceberg 300 feet high, 600 to 700 feet long.
1855	47	47	22	0 W.	"Supposed ice."
—	47	51	21	0	Many icebergs.
—	48	0	18	37	Two large icebergs.
—	48	0	21	0	A very large iceberg.
1853	53	0	19	0 E.	An iceberg.
1860	53	0	49	0 W.	A large iceberg, and some small pieces.
1853	53	12	21	23 E.	Three icebergs and field ice.
1860	54	57	65	10 W.	"Passed two large icebergs in the straits."
—	56	0	62	0	Two large icebergs 50 miles apart, E.N.E. and W.S.W. (true).
—	57	0	66	16	A large iceberg.
1845	57	45	61	5	An iceberg.
1860	59	6	71	16	A large iceberg, and a quantity of pieces.
1859	59	50	68	0	Three large icebergs.
					November.
1856	37	43	13	30	A piece of ice, much kelp.
1853	40	45	4	0	An iceberg.
1854	43	38	8	15 E.	Four large icebergs.
1858	44	11	0	45 W.	An iceberg.
1854	44	24	22	0	Three icebergs. Water 52°.
1855	44	30	16	0 W.	A large iceberg, 4 miles to the E.S.E.; air 46°, water 45°. Steering eastward, passed six more icebergs in the next six hours.
1853	44	41	3	51	"Supposed ice in neighbourhood."
1855	44	39	15	28	Seven icebergs.
—	44	52	12	0	Three icebergs, one very large.
1856	46	22	8	0	A large iceberg.
1855	47	10	16	11	Numerous icebergs.
1856	47	10	9	0	Several small icebergs.
—	47	28	8	0	A large iceberg, with small ice to leeward of it.
1853	47	40	10	0	An iceberg.
1855	47	50	2	0 E.	A very large iceberg.
1854	48	0	18	0 W.	A very large iceberg.
1855	48	4	14	20	Six icebergs. Temperature of air 36°, water 37°.
—	48	7	3	27	Several very large icebergs.
1856	48	8	5	58	One very large iceberg and several smaller ones.
1859	48	50	33	0	A small iceberg.
1856	48	55	1	0	Two icebergs.
1857	48	55	32	20 E.	Passed four small icebergs, extending E. and W. Air 39°, water 37.5°.
1856	49	19	7	30	Two icebergs.
—	49	30	10	45	Six small icebergs.
1855	49	35	9	57 W.	A large iceberg. Temperature of air 35°, water 38°; both at about 200 yards distance.
—	49	50	7	57	A large iceberg.
—	49	45	13	42 E.	Four small icebergs.
1861	50	40	20	35	Saw an iceberg 5 miles to S.W., height 80 feet, length 400 feet.
—	50	45	23	10	An iceberg 50 feet high. The temperature of the water fell 1° when we crossed the wake of it, and rose again, in ten minutes after it was passed, to what it was before we came to it. This does not show the temperature to be an infallible guide when the previous temperature is low.

Year.	Latitude.	Longitude.	Description.
Nᴏᴠᴇᴍʙᴇʀ—*continued.*			
	° ′	° ′	
1856	50 50	15 0 E.	"Plenty of ice about."
1852	50 50	45 0 W.	An iceberg about 200 feet high, which much resembled an island till within about a mile of it; the deception was caused by a vapour which ascended from its base.
1861	50 51	28 12 E.	An iceberg 50 feet high. Temperature of water 39° when within 7½ miles of it; when within 400 yards of it the temperature was still 39°.
1853	52 26	19 42 E.	A large iceberg.
1860	52 30	52 50 W.	Two large icebergs.
—	52 50	54 25	A large iceberg, 100 feet high, and nearly circular.
1860	53 6	54 36	Two icebergs, about 5 miles in length, 3 in breadth, and about 200 feet high.
—	54 36	57 46	A large iceberg, about 4 miles long, 3½ miles broad, and 200 feet high.
—	54 53	60 16	A large iceberg, 2 miles long and 150 feet high, in the form of a wedge sloping to the S.W.: also some large pieces of ice about the size of the ship.
1854	56 30	56 0	Icebergs.
1859	56 30	55 0	A large iceberg.
1860	57 40	64 40	A large iceberg.
1854	58 0	59 0	Icebergs.
—	61° to 58°	65° to 61°	Numerous icebergs.
Dᴇᴄᴇᴍʙᴇʀ.			
1855	43 33	18 10 E.	Two large icebergs.
1854	44° to 43°	28 0 W.	An immense connected mass of icebergs.
1855	47 10	4 38 E.	One small iceberg.
—	47 20	5 10	Passed close to small iceberg; air 38°, water 36°.
—	47 22	6 6	Two icebergs; one large.
—	47 30	10 8	Iceberg 40 feet high: distant 100 yards: water 38°.
1854	47 33	18 10	Two icebergs.
1855	47 40	9 55	One small iceberg.
—	47 43	10 59	A large iceberg. Air 43°, water 44°.
—	47 50	11 26	Seventeen icebergs passed during the day. They appeared to be in lines running N.W. and S.E. Temperature of the air (noon) 55°, water 45°.
—	48 0	26 10	Passed two icebergs, detached pieces floating about. Air 38°, water 36°.
—	48 0	13 21	An iceberg, and several small pieces.
—	48 2	15 39	Twelve icebergs; some very large.
—	48 13	24 50	Passed close to large iceberg, one-third of a mile in length, and 300 feet high, and became surrounded with loose ice and small bergs. Twenty-four hours later, steering to the eastward, saw three icebergs, the largest of which was about 2 miles long. We are falling in with a great deal of ice.
—	48 38	24 45	A large iceberg, distant 6 miles: water 38°.
—	48 51	9 26	About eighty icebergs, and much drift ice.
—	49 7	11 48	Passed many icebergs.
—	49 20	2 30	Several icebergs.
—	49 30	6 0 W.	Several very large icebergs.
1856	49 34	43 14	Ten icebergs; some very large.
1855	49 36	1 55	Two icebergs, about 2 miles long.
	49 43	6 18 E.	Many icebergs of various sizes.
	50 0	2 30	Two icebergs; one 100 ft. in height. Temperature of water 34°.

YEAR.	LATITUDE.		LONGITUDE.		DESCRIPTION.
					DECEMBER—*continued.*
	°	′	°	′	
1856	50	14	42	54 W.	Ten icebergs all round; they will probably soon break up. Air 43°, water 41.
1854	50	30	19	30	Icebergs.
1772	50	40	20	0	An ice island, 50 feet high, and half a mile in circumference.
1854	50° to 53°		3° to 22°		Numerous icebergs.
—	51	17	6	0	Four large icebergs. Water 36°.
—	51	45	8	5 E.	Ice. Air 42.8°, water 33.8°.
—	52	0	9	52	Nine icebergs. Water 32°.
—	52	0	15	25	Four icebergs. Water 30°.
—	52	12	15	24	Eight icebergs.
1856	52	12	44	31 W.	An iceberg, drifting apparently to the N.E.
1854	52	29	15	23 E.	Four icebergs. Water 31°.
1856	52	30	43	40 W.	Nine icebergs, in a line East and West.
1857	53	15	57	41 W.	An iceberg. Air 41°, water 43°.
1772	54	0	20	52 E.	Icebergs and icefields.
1856	54	12	48	0 W.	One large iceberg.
1830	55	30	13	0	Icebergs.
1854	55° to 56°		49° to 47°		Numerous icebergs.
1830	56	30	13	0	Icebergs.
—	57	0	23	0	Icebergs.
1857	57	12	66	12	An iceberg to the southward.
1830	58° to 57°		9° to 10°		Numerous icebergs.
					JANUARY.
1850	34	0	20	20	An iceberg seen from the Cape.
1850	34	50	18	30	A piece of ice, very flat, 30 ft. long, 100 ft. thick, in sight of the Cape of Good Hope.
1155	40	0	36	0 W.	Numerous icebergs.
—	41	0	17	0	An iceberg.
—	42	0	14	0	Icebergs.
—	42	0	16	0	An iceberg.
—	42	0	22	0	Connected icebergs.
—	42	18	12	8	Thirty-four icebergs, all sizes.
1855	43	40	16	52	Twenty-six icebergs, all sizes.
1856	44	25	18	14 E.	A large iceberg, surrounded by large pieces.
1855	44	20	2	47 W.	Fragments of an iceberg.
1859	45	8	11	54 E.	An iceberg, bearing E.N.E. about 20′. Temperature of air and water 46°.
1856	45	30	45	30 W.	Several icebergs.
1855	45	33	15	33 E.	Three icebergs, 100 feet long, 150 feet high.
—	45	40	21	0	Icebergs.
1856	46	15	6	43 W.	Three large icebergs.
—	47	15	14	0	Icebergs.
—	48	15	10° to 15° E.		Thirteen large icebergs.
—	48	30	15	27	A large iceberg.
—	49	0	17	0	Three icebergs.
—	49	4	19	20	A large iceberg.
—	49	10	14	0	Icebergs.
1857	50	52	17	39	A large iceberg, drifting to northward. Temperature of air 47°, water 37°.
1858	51	24	44	53 W.	Icebergs.
1857	51	30	49	49	Numerous icebergs.
—	51	30	20	42 E.	An iceberg, much broken up, and drifting fast to North. Water 37°.
—	52	2	22	26	Icebergs observed.
—	53	0	48	0	Numerous icebergs.
—	53	30	51	0	Numerous icebergs, one 3 miles long.

YEAR.	LATITUDE.	LONGITUDE.	DESCRIPTION.
			FEBRUARY.
	° ′	° ′	
1855	41 30	18 30 E.	Icebergs.
—	41 30	21 40	Connected icebergs.
1856	46 59	12 15 E.	An iceberg.
1855	47 13	20 0	Several icebergs.
1858	50 14	44 0 W.	A few pieces of small ice.
—	50 45	46 58	Several icebergs.
—	50 45	49 47	Two icebergs.
—	50 54	47 45	Several icebergs. Temperature of air, 52°, water 44°.
—	50 54	45 22	Twenty icebergs, some 300 feet high, and 3 miles long. Air 46°, water 44°.
—	51 0	47 0	Numerous icebergs.
1858	51 3	48 22	Passed several icebergs. Air 46°, water 44°,
1855	—	—	Numerous icebergs.
1858	51 28	49 7	Several icebergs.
1774	52 30	4 0	Three icebergs.
—	53 30	6 35 E.	Three icebergs.
—	53 30	8 0 W.	Two icebergs.
—	53 54	0 30	Three icebergs.
—	53 54	6 35 E.	Many ice islands.
—	54 0	21 0 W.	Several icebergs.
—	54 20	15 30	Three icebergs.
1775	57 20	4 0 E.	An iceberg.
1860	57 50	53 8 W.	Numerous large icebergs.
1775	58 0	6 3	Three icebergs.
1860	58 0	56 16	Two icebergs.
			MARCH.
1855	49 40	21 20 to 23 30 W.	Connected icebergs.
—	42 20	14 40	Icebergs.
—	42 35	16 0	Icebergs in great quantities.
1855	42 40	14 15 W.	Passed close to a berg. Thermometer fell 2° near the ice. Air 55°, water 48.8°.
—	42 42	16 0	Ice to N.E. and South.
—	42 46	16 1	Icebergs in great quantities.
—	43 19	14 17	A piece of ice.
—	44 37	12 40 W.	Ice. Air 51.3°, water 45.8°.
1856	46 50	3 11 E.	Icebergs.
1855	44° to 52°	32° to 39° W.	Thirty-nine icebergs.
1774	48 30	14 26 E.	Two large ice islands.
1858	49 45	41 30 W.	Four icebergs.
1855	40 37	6 54	A piece of ice and two bergs.
1858	50 0	48 0	One iceberg.
—	50 10	47 21	Seventeen large icebergs.
—	51 0	50 0	Icebergs.
1855	50° to 52°	7° to 0°	Numerous icebergs.
1858	51 30	42 34	Two icebergs.
1855	51 40	4 2	Ice. Air 41.9°, water 31.1°
—	52 18	0 27	Many ice islands.
—	52 30	5 4 E.	Many ice islands.
—	52 30	40 30 W.	Numerous icebergs.
—	52° to 53°	0° to 23° E.	Numerous icebergs.
—	53 14	20 44	Nearly beset in the ice.
—	53 14	14 41	Many ice islands, and an iceberg 960 feet high. Water 34°.
	53 17	11 53	Many ice islands.
	52° to 58°	60° to 68° W.	Numerous icebergs.

Year.	Latitude.	Longitude.	Description.
			April.
	° '	° '	
1828	35 50	18 5 E.	Many icebergs, some 100 feet high.
1853	36 0	20 0	Numerous icebergs.
1828	37 30	18 7	Five icebergs, about 250 feet high.
1855	40° to 41°	20° to 22° W.	Connected icebergs.
—	43 0	5 0	Numerous icebergs.
1856	43 0	16 45	Two icebergs. Air 47°, water 40°.
1855	43 8	12 42	Numerous large icebergs.
—	43 30	13 0 E.	Numerous icebergs.
1856	45 20	12 30 W.	Passed two icebergs. Water 40°.
—	47 15	16 33	Thirty icebergs.
1855	47 46	7 47 W.	Three large icebergs.
1856	48 9	7 38	Seven icebergs. Air 46°, water 36°.
1855	48 20	48 40	Several icebergs.
1856	48 34	6 26 W.	Twelve icebergs passed in this locality in two days.
—	48 35	11 0 E.	Forty icebergs.
1855	48 43	11 45	A large iceberg, 400 ft. high, and much broken ice.
—	48° to 49°	6° to 12°	Numerous icebergs.
—	48 44	6 43	"An ice island, 300 ft. high, and many ice fields: and in the evening passed numerous icebergs and pieces." Air 37.6°, water 38.3°.
—	48 46	7 47 W.	Three large icebergs.
1856	49 32	8 30 E.	Field ice and icebergs.
—	49 59	0 30	"Steering N.N.W., parallel with a line of forty-seven icebergs."
—	50 18	1 7 W.	A long line of icebergs, N.N.E. and S.S.W. Air 44°, water 32°.
1855	51 0	40° to 39°	Numerous icebergs.
—	51° to 55°	44° to 40°	Drift ice (debris of icebergs?).
—	50 0	41 0	Icebergs.
—	53 0	41 0	Numerous icebergs.
			May.
1839	39 30 S.	16 11 E.	An iceberg, 250 feet high.
—	48 0	18 0	Several icebergs, one covered with snow and broken ice.
—	49 0	11° to 31°	Numerous icebergs.
1856	58 35	67 38	A small iceberg.

REMARKS.

(222.) The foregoing list will be amply sufficient to demonstrate the locality and frequency of the ice-drifts. It sufficiently explains itself in these particulars; but the following remarks, appended to the Tables in the Report of the Meteorological Department, and in Mr. Towson's Paper, will be interesting.

(223.) A glance at the charts will show where ice has been met with in any month, and a reference to the the catalogue will show the year in which that ice was seen, as well as the description of ice, when known, whether bergs or drift ice, &c.

A reference should always be made to the catalogue, for the charts alone would be apt to mislead. For instance, the chart for September shows a great deal of ice near the Cape of Good Hope, but, by referring to the catalogue, it appears that this circumstance was quite exceptional, for all this ice was seen in the years 1840 and 1844, and since 1844 no ice has been met with near the Cape in September.

It will be observed that few reports of ice are recorded, save near the usual tracks of ships. It would be wrong to infer from this, that the regions South of the usual route are comparatively free from ice; the fact being that we have not sufficient information on the subject to speak positively, although in certain seasons more icebergs seem to be met with in the lower latitudes than in the higher in the Pacific. A remarkable instance of this, mentioned by Mr. Towson, occurred in November, 1854, when the *Great Britain* passed 280 icebergs in 56° S. latitude, between 112° and 92° W., while the *Golden Era*, passing the same meridians at the unusually high latitude of 63° S., never met an iceberg, nor, until reaching 72° W., when she was surrounded by pack ice, and narrowly escaped being wrecked, did she experience any inconvenience from ice.

One thing is quite evident, that there is far greater danger from ice during the summer months, in the southern hemisphere, than during the winter. Of about 550 reports of ice sighted, nearly half occurred in November, December, and January, while there are only five reports of ice having been seen in June, and only three in July. One-fifth of the reports relates to ice sighted in December, and the ice seen in June and July together is to that met with in December alone, rather less than as 1 to 13.

The decrease from January to April is less rapid than the increase from August to November, and the probability of falling in with ice in the autumn months of March and April is as 5 to 3 nearly, compared with the chance of sighting it during the spring months of September and October, although more ice has been seen in December than in any other one month.

(224.) Many of the icebergs which have been reported were of immense size. The Dutch ship *General Baron Von Geen*, on the 16th of August, 1840, passed one about 1,000 ft. high, in 37° 32′ S., 14° 10′ E.; another, 960 ft. in height, was sighted by the *Agneta*, in lat. 53° 14′ S., long. 14° 41′ E. on the 23rd of March, 1855; an iceberg, as large as Tristan d'Acunha, in lat. 53° 40′ S., long. 123° 17′ W., on the 15th of May, 1859, is reported by the *Bosworth*; and the *Queen of Nations* fell in with one as high as 720 ft., in 53° 45′ S., 170° 0′ W., on December 25th, 1861.

Several icebergs, 3 miles long, and about 300 ft. high, were passed on February 12th, 1858, in lat. 50° 54′ S., long. 45° 22′ W., by the *Light of the Age*, and another of about the same dimensions by the *Silistria*, not far from Cape Horn, in lat. 56° 50′ S., long. 63° 0′ W., on the 29th of September, 1860.

The extraordinary mass of ice which, though not exceeding 300 ft. in height, was reported to be 60 miles by 40 miles long, and which was seen by many ships during the five months of December, 1854, and January, February, March, and April, 1855, is fully described in Mr. Towson's pamphlet, quoted hereafter. This mass of ice is supposed to have consisted of numerous connected icebergs. During the time mentioned it floated from about 44° S. 28° W. to 40° S. and 20° W. No report of this ice having been seen after April, was received, so that it probably broke up and dispersed shortly after that time, or else turned southward, and drifted out of the usual track of ships.

In September, 1865, an immense ice island was found by Capt. John Jones, in the *Alice Davies*, lat. 45° 30′ S., long. 38° 40′ W. The extent of this ice island, which appeared to be flat-topped and "level-looking," was about 25 miles in a North and South direction, and extended farther than the eye could reach to the N.W.

A very large iceberg, about 580 ft. in height, and nearly 3 miles long, was seen by Capt. Smithers, of the *Edmond*, in lat. 50° 52′ S., long. 43° 58′ W., on the 1st of December, 1859. So strongly did this iceberg resemble land, that Capt. Smithers believed it to be an island, and reported it as such; but there is little or no doubt that it was in reality an iceberg. There were pieces of drift ice under its lee.

It was near the same place, in 50° 50′ S., 45° 0′ W., that another iceberg was passed by the *Gleaner*, only a fortnight earlier, about 200 ft. high, and resembling an island very strongly until the ship was within about a mile of it, the deception being aided by a vapour which ascended from the base of the iceberg, and hung about one side of it.

In December, 1861, the *Queen of Nations* passed an iceberg, apparently very old, and having the appearance of earth sticking to it, in 57° S., 146° W. This berg may possibly have grounded, and subsequently floated again, and turned over.

The temperature of the water does not seem to be an infallible guide as to the vicinity of ice, although generally on approaching ice there is a marked diminution in the temperature of air and water, but especially the latter.

Capt. Clark, of the *Lightning*, in February, 1860, when in lat. 55° 20′ S., long. 125° 45′ W., found the surface temperature as high as 45°, although there was ice at a distance of only 2 miles and on both sides of the ship (one berg being 500 ft. high, and 3 miles long), while a few days later, in lat. 56° 0′ S., long. 90° 54′ W., there was a sudden (but only temporary) fall of the surface temperature to 38°, though there was no ice, or any appearance of it.

(225.) Mr. Towson says: But most of the reported masses of ice appear insignificant when compared with a body of ice reported to have been passed by twenty-one ships during the five months of December, 1854, and January, February, March, and April, 1855, floating from lat. 44° S., long. 28° W., to lat. 40° S., long. 20° W.

This mass has received the various denominations of an immense iceberg, an ice-island, "groote ijs eiland," and a connected mass of icebergs. Its elevation in no case exceeded 300 ft.; but its horizontal dimensions were 60 miles by 40 miles. It was of the form of a hook, the longer shank of which was 60 miles, the shorter 40 miles, and embayed between these mountains of ice was a space of water 40 miles across. The first account of it was received from the *Great Britain*, which, in December, 1854, was reported to have steamed 50 miles along the outer side of the longer shank. This longest range of ice then bore N.E. and S.W., the bay before alluded to being open to the N.E. Whilst in this position it exposed ships to but little danger, since the bay could only be entered on the opposite course to that of ships on their homeward passage from Australia. But during the next three months it swung round 90° to the left, and drifted E.N.E. about 100 miles, which brought it very near to the route of outward-bound ships, with the bay open to their track. We can scarcely imagine any mass of ice in an equally dangerous form, and I regret to add that one emigrant ship, the *Guiding Star*, was embayed and lost on it with all hands. The *Cambridge* and *Salem* were also embayed in March and April, 1855, but through the skill of their commanders they were extricated from the most perilous situation in which we can conceive a ship to be placed by ice in any form. Beyond doubt this was an extraordinary phenomenon, there being no record of any other mass of ice bearing even approximate horizontal proportions to those now described.

(226.) Mr. Towson says: In tracing some remarkable masses of ice, I have been able to determine the direction of their drift, and their rate of progress. With the exception of one locality, the course of an iceberg is E. by N., rate 10 miles per diem. The only exception is, after it has passed to the eastward of the Horn, when its course bends to the N.E., veering round to the East as it approaches the latitude of 40° S., on which parallel from the meridian of 25° W. to 15° W., its progress is scarcely 1 mile daily, in direction nearly East. This course is afterwards bent towards the South, crossing the meridian of Greenwich on the S.E. rhumb. I have been unable to determine whether it again changes its course to E. by N., or returns by a vortical current to the neighbourhood of the Horn. There are facts tending to support both of these hypotheses; but since near the meridian of Greenwich, few ships go higher than lat. 50° S., we have not a sufficient number of observations to enable me to decide this question.

THE ROLLERS OF ASCENSION, FERNANDO NORONHA, ST. HELENA, ETC.

A very important subject in connection with landing or embarking on an unprotected coast, such as those of almost all parts of the South Atlantic, and especially on the islands which lie in it, is the occurrence of that heavy swell which sets on without any previous indications, and renders the use of boats impossible.

Such phenomena are not rare in many parts of the world, and are even experienced on the coasts of Great Britain, but are of very great magnitude on the beaches of the islands in question. Their origin has been the subject of much discussion, and of very varied opinions, for nothing very definite has been obtained respecting them. It was in the former editions of this work that the editor first promulgated the view that *they were caused by distant cyclones;*
his, it will be seen, is now to be considered as the most probable source
gular visitations. The following notes are taken from our previous

tive of Mr. Webster, this gentleman says, "One of the most
omena that the island affords is that of the rollers; in other
ell producing a high surf on the leeward shores of the island,
y apparent cause. All is tranquil in the distance, the sea

breeze scarcely ripples the surface of the wave, when a high swelling wave is suddenly observed rolling toward the island. At first it appears to move slowly forward, till at length it breaks on the outer reefs. The swell then increases, wave urges on wave, until it reaches the beach, where it bursts with tremendous fury. The rollers now set in and augment in violence, until they attain a terrific and awful grandeur, affording a magnificent sight to the spectator, and one which I have witnessed with mingled emotion of terror and delight. A towering sea rolls forward on the island, like a vast ridge of waters, threatening, as it were, to envelope it; pile on pile succeeds with resistless force, until, meeting with the rushing off-set from the shore beneath, they rise like a wall, and are dashed with impetuous fury on the long line of the coast, producing a stunning noise. The beach is now mantled over with foam, the mighty waters sweep over the plain, and the very houses at the town are shaken by the fury of the waves. But the principal beauty of the scene consists in the continuous ridge of water crested on its summit with foam and spray; for, as the wind blows off the shore, the over-arching top of the wave meets resistance, and is carried, as it were, back against the curl of the swell; and thus it plays elegantly above it, as it rolls furiously onward, graceful as a bending plume; while, to add more to its beauty, the sunbeams are reflected from it in all the varied tints of the rainbow.

"Amid the tranquillity which prevails around, it is a matter of speculation to account for this commotion of the waters, as great as if the most awful tempest, or the wildest hurricane, had swept the bosom of the deep. It occurs in situations where no such swell would be expected, in sheltered bays, and where the wind never reaches the shore. The strong and well-built jetty of the town has once been washed away by the rollers, which sometimes make a complete breach over it, although it is 20 ft. above high water mark. On these occasions the crane at its extremity is washed round in various directions, as the weathercock is turned by the wind, and landing becomes impracticable for the space of two or three days. Such are the Rollers of Ascension, and like unto them are those of St. Helena and Fernando Noronha.

"The season in which the rollers prevail is from December to April, not but that they do occur at other periods, and they have been felt severely in July. Ships at the anchorage are perfectly secure, and they have to apprehend no danger unless within the immediate influence of the breakers. Not only are the seasons of the Rollers the same at St. Helena and Ascension, but they sometimes are simultaneous in occurrence. The *Chanticleer*, while at anchor at St. Helena, on the 17th and 18th of January, 1830, experienced some very high Rollers, inasmuch as Capt. Foster and his gig's crew landed with the utmost difficulty. On our subsequent arrival at Ascension, I inspected the "Meteorological Journal" of my friend Mitchell, the surgeon of the island, and found it noted that the Rollers were so violent on the 15th, 16th, and 17th of January, that landing was impossible. Here, then, is a coincidence as to time.

"The cause of the Rollers has been speculated on, and various conjectures have been formed of them. Some have attributed them to the effects of the moon:—

> 'Whom Ocean feels through all his countless waves,
> And owns her power on every shore he laves.'

And others have attributed them to the tides; but it is evident that these have nothing to do with them. They occur in the most tranquil season of the year, when the S.E. trade wind is often very light, where the vast volume of water is constantly impelled in one direction. There is then a tendency to a back set, or a rush of water in a contrary direction, and a tumultuous swell is produced wherever it meets with the resistance from the islands and the banks on which they are based, as well as the shores of a continent. The long steep beaches of Ascension are admirably adapted for the full display of the effect which has been just described."

Commander Fishbourne, R.N., gives the following from his experience at Ascension, &c., which will be interesting in addition to the preceding.

"The Rollers are said to be very capricious in their rise and progress; but this assertion, I think, will fall before continued observation; and my experience of eight months tends to show that they render to reason a sign of their coming, if not a solution of their cause. A distant ripple, extending itself to the N.W. from the extremes of land, was visible from any part of the bay or island, appearing to arise from the water outside of the island being higher than that within the bay.

"This ripple was apparent from the middle of February to August, and of greatest amount in May and June, and seems to be the result of a N.N.-Westerly current, which runs during these months. This current divides at the southern extremity of each bay, preventing a direct inflow. Thence the direction of the Roller must depend upon the position of the bay with respect to the current.

"They commence, however, generally from a quarter as far to the southward as the southern extreme of each bay will admit of; from which direction, subsiding as they alter their progress, or sweep round the point of the bay, they disappear about five points North of the first direction. They commence in February, and become more frequent and heavy in May and June, after which they are less in size and frequency, and cease in September. I have been told that Rollers come in from the North in December. This, however, is rare; but they are then quite as high, if not higher, than at any other period. While I believe the direction to be correctly stated, I think the height exaggerated, it being estimated from the effect on the pier, which effect must always be greater, all other things equal, than from any other direction, on account of the more direct action, the pier being open most to waves from North to N.E., the foul ground breaking their force when from the westward.

"The rollers were generally preceded by light and variable winds, and followed by an increase of trade wind (considerable when the rollers were highest) and an extremely attenuated atmosphere, so transparent that the Green Mountain certainly appeared but half its distance from the anchorage, and this without any increase of moisture. Once there was considerable moisture; the mountain then appeared still nearer, and the rollers were accompanied if not preceded by rain. Attention to these indications enabled me to predict the coming rollers; and though I inferred corresponding barometric changes, I was not surprised at the apparently insufficient differences, on account of the many circumstances attending to vitiate the apparent unconnected, if not corrected results. For instance, the mountain being on the weather side of the island, and the bay on the lee, the clouds condensed by the mountain, pass over in dense masses, assuming a singular constant triangular shape, during the afore-mentioned months, the apex of the triangle being in the N.W. Though the tide may be in some measure corrected when regular, its height is too irregularly modified by the rollers to admit of a correction. The concentrated heat in the bay, modified by the direction and force of the wind, producing a greater or less increase of elasticity, all tend to vitiate barometric results.

"The following may go far to elucidate the causes of the above mentioned effects. Lieutenant Bold, in his 'African Guide,' says, 'that the currents have northing or southing in proportion as the trades incline towards the tropics, and their velocity is increased by an increase of the trade wind.' Now, such must be the case at this place during the months of May, June, and July, when the S.E. trade is extending its northern limit further to the northward, and will account for the strong ripple mentioned before, and also for the strong N.N.W. current, which we found in July to be running full 36 miles in twenty-four hours, in smooth weather, and must have been quite 35 miles during the storm breeze which we experienced in June. Again: the height of the barometer in this latitude being less than it is to the southward, this last increased perhaps by there being more southing in the wind in May and June, together with the fact that the rarefaction of the air in the tropics (and being greatest here about May and June) producing an ascending, consequently relieving pressure current, and to the greatest amount during these months, will tend to induce a wave in this direction from the point of greatest pressure, which must be from the South, while the sun is so far North of this latitude; and from the high barometric states, together with the descent of the superior return current in the southern latitudes, we may infer a wave will be propagated in the direction of the point of least pressure, which will be generally to the northward in this hemisphere; but I presume must be so during the months of May and June.

"If this implied want of hydrostatic equilibrium be correct, it ought to be greatest or at least produce greatest effects on the winds, currents, and rollers, in the months of May and June. I find, on reference to the log, that the winds were of greatest force during the last days of April; but still strong through May and June. The *Edward*, of Shields, arrived here, having experienced strong winds in May; and H.M. ships *Fawn*, *Prompt*, and *Rolla*, arrived here early in June, having had to contend with strong southerly winds, with a northerly current; and referring to the remarks in the meteorological table, I find that the rollers rose heavy and most continuous in May and June.

"To account for the change of direction in the rollers, as they pass to their subsidence, I can well imagine that, as the equilibrium is in process of restoration, the currents of the water and air will decrease in velocity; the wave also will decrease and alter its direction, till even re-action may produce almost an opposite direction; in which cases it must roll into bays open to the N.W. The anchorage here, and at St. Helena, being on the N.W. side of the islands, may account for the rollers being said to come from the N.W.: and it is probable that they are highest at the anchorages, from their being to leeward. The period when the rollers are said to come in from the northward being in December, at which time the sun is in high South declination, it is not improbable, I think, that the pressure may be greater to the northward than here, and hence propagate a wave in this direction. There is a singular, and, as I am told, regular process observable here; and it appears consequent upon the rollers or their causes, which is a beautiful illustration of a nice adaptation of a universal law to the individual latitudes, and another of the many proofs of design with which earth, air, and ocean are strewed, bespeaking a Creator, lavish in greatness, supplying all our real wants, and bounteous in goodness and truth.

"The selvage of land round the bays where the turtle lay their eggs is increased considerably in breadth during the season of incubation. In this process of extension it becomes shelving and easy of access; after which it appears to narrow to its original dimensions, and becomes precipitous; thus affording additional space and facility of gaining it."

In our Sailing Directory for the West Indies, pt. i., page 13, 1879, is given an extract from a paper by Schomburgck, in which the reader will find descriptions of these phenomena on the north-eastern face of the West India Islands.

These remarkable waves, which are felt on most of the shores of the ocean, have, it is probable, different causes which produce them; but their most frequent origin, it may be assumed, is in the hurricanes and storms of the Equatorial regions.

A few extracts will illustrate our point, that they are caused by the cyclones and gales of distant regions.

Captain Midgley says, "On my outward passage from Liverpool to Africa, in the ship *John Campbell*, on the 29th of December, 1840, in lat. 33° 3′ N., long. 19° 24′ W., about 3 p.m., I found the vessel suddenly entering into very heavy rollers, setting from the N.W. quarter. The wind was moderate from S.E. by E., the ship steering to the S.W. *Much sheet lightning had been previously seen in the N.W. quarter*, and a few showers of rain had fallen. These rollers were in too regular ridges to be mistaken for the sea which marks the commencement or termination of a gale of wind, although they sometimes topped into breakers. The ship was going 5 knots through the water, and came suddenly amongst them, when the rollers increased very rapidly, and as rapidly terminated. The ship continued in these for about 4 hours, and sailed 21 miles through them. The weather fine and clear, and the barometer perfectly steady throughout the day (at least from the preceding noon), at 30·20, attached thermometer, 64° Fahrenheit at 8 p.m., moderate breezes from S.E. by E., with generally fine clear weather, and much sheet lightning in the N.W. quarter."

Captain FitzRoy says, "Returning homeward by St. Helena, Ascension, and the Cape Verde Islands, I had opportunities of proving that the rollers, which sometimes set heavily on their shores, are cause by distant gales of wind. Those at Ascension and St. Helena, for instance, by pamperos, and those at the Cape de Verdes by the severe though generally short gales met with between the tropics, in the time of the westerly monsoon. These latter gales may also send rollers toward the N.W. side of Ascension." [*]—" Geog. Journal," Vol. VI., page 335.

Sir R. Schomburgck, in the before-mentioned paper, states, " The period when the ground sea sets in is generally October, and it continues, though with some intermission, till April and May. Any individual acquainted with the coasts of North America will be aware that during that time frequent storms prevail, and the circumstance that a northern wind either precedes, sets in with, or follows a ground sea, and that only the northern sides of the West India Islands are exposed to it, confirms me in my opinion, that it is caused by gales in the Atlantic, or on the northern coasts of America."—" Journal of the Geographical Society," Vol. V., p. 24.

Their simultaneous occurrence at St. Helena and Ascension, as described on a preceding page, is an additional proof of their distant and similar origin.

The diminished pressure of the atmosphere, indicated by the fall of the barometer, during the period of the hurricanes, and the probably consequent elevation of the level of the sea at that place, from this cause, will also tend to explain their origin: for after the storm had ceased the sea would naturally fall,[†] perhaps to a lower level than usual, and thus give an additional impetus to the waves, risen by the tremendous effects of the wind.

These waves, which increase in magnitude and velocity in their onward progress from the centre, from their becoming merged and united, thus attain a regularity and height quite distinguishable from the ordinary swell of the ocean; as may be seen on a small scale, by the concentric ripples caused by dropping a stone into the smooth waters of a lake, and thus when they arrive at any point which interrupts their course, the magnificent effects described occur. These waves, which obviously would be heightened in their effects and continuance by the wind blowing in the direction of their course, would proceed onward until their velocity and diminished elevation are entirely spent.[‡]

By the magnitude of the wave is not meant the actual height of it, but rather its breadth; for as the larger the wave the greater is its velocity; and, therefore, it will have a greater effect when striking against a shore.

Another cause of the rollers, ground swell, or ground sea, may be an earthquake; but as these are but of rare occurrence, and of short duration, the larger number of these phenomena cannot be referred to such an origin.*

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[*] " The heavy rollers which sometimes set in upon the coasts of Chili and Peru, led me to seek for proofs of the causes being such as I then suspected. But there is at times another kind of " rollers," which are perhaps caused by an earthquake."—*Ibid.* p. 335.

[†] " Before a hurricane at the Mauritius, the water rises considerably, and is agitated. In other parts of the world the sea rises before a storm some feet above its usual level. At the same time, the mercury in a barometer falls. Is not this rising of the waters caused by diminished pressure of the atmosphere at those places, while at other more distant parts there is an increased pressure ?"—*Captain FitzRoy.*

The *seiches* of lakes and inland seas, described by Colonel J. R. Jackson, in the " Geographical Journal," arise from the same cause. One portion of the Lake of Geneva, the Baltic, the Caspian Sea, or the Mediterranean, being frequently observed to rise or fall below their usual level, without any apparent or adequate cause.—" Geographical Journal," Vol. III., p. 271.

[‡] That this distance is very considerable at times, may be inferred from the fact that " heavy rollers, at times (though rarely) set into Good Success Bay, in the Strait of Le Maire."—" Voyages of the *Adventure* and *Beagle*, Vol I., p. 456.

For other particulars concerning them, the reader is referred to the "North Atlantic Memoir," and the Directory for the West India Islands.

The following remarks by Lieutenant Langham Rokeby, R.M., in charge of the Observatory at Ascension, dated April, 1866, will confirm, in a great measure, the proposition previously advanced, respecting the origin of the rollers, viz.: that they are caused by distant storms or cyclones. As will be seen, they are based on the personal observation of the author, and the records of the island for nearly 40 years :—

The phenomena of the rollers which occur at various times during the year on this island, as well as at St. Helena, have been, I believe, often commented upon, and their cause has been the subject of some little dispute; some persons maintaining that they are caused by volcanic eruptions, some by the return of the waters after having been heaped up by the action of the trade winds, and some by the rotation of the earth upon its axis. The most popular theory with the residents of this island is that of volcanic eruptions. I believe that Mr. Mallet's definition of an earthquake is, that it is "the transit of a wave or waves of elastic compression in any direction, from vertically upwards to horizontally in any azimuth through the substance and surface of the earth, from any centre of impulse, or from more than one, and which may be attended with sound, and tidal waves dependent upon the impulse and circumstances of position as to sea and land."

If, then, the rollers were caused by an earthquake, or by a submarine volcano, there would, in either case, be a volume of water forced upon the sea's surface, and each wave would be "propagated outwards over the surface of the sea, like the circles or ring-shaped waves on a pond when a stone is dropped into it;" and the direction of these waves might, therefore, be from any point of the compass. But with the "roller" this is not the case, for their direction is from the south-west, veering gradually by the West to north-west during the greater portion of the year, and from the north-east, changing their direction by the North to north-west, during the remainder of the year.

Again, if volcanic eruptions were the cause, the eruptions must be very numerous; and in order to produce the change in the direction of the rollers during their continuance, the seismic vertical must not only be varying every day, but must also vary in certain directions during certain portions of the year. The return of the waters after having been heaped up by the trade wind, is a theory with which I am, to some extent, unacquainted; but is it not reasonable to suppose that the return of the waters would always be in a direction opposed to the south-east trade wind?—and during the calm which succeeds a strong trade wind should we not invariably have rollers? I have before stated that the general direction of the rollers is from the south-west; they are particularly heavy during the month of August, when the south-east trade wind blows with its greatest force. This would, therefore, seem a sufficient proof against this theory.

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* "Edinb. Roy. Trans.," Vol. VII., p. 154.—Waves from earthquakes; and also "Journal of the Royal Geographical Society," Vol. VI., p. 322, et seq.

From the foregoing statement I should imagine that the theory of the rotatory motion of the earth would hardly hold good. The facts which I shall now lay before your readers are partly the results of my own observations, and have partly been ascertained from the records contained in the island journal since 1827. 1st. The direction of the rollers varies during certain periods of the year. 2nd. From November until February they commence from the N.E., and retrograde to the North and West; while from May until October their direction is from the S.W., veering round by the West to the North. 3rd. In each case, the nearer their direction is to the S.W. and N.E. points at their commencement, so much the heavier are they, and the longer is their continuance.

These facts lead me to believe that the rollers are in some way caused by cyclonic storms. These rotatory storms have been proved to revolve against the sun in the northern hemisphere and with the sun in the southern; the waves, therefore, produced by these storms must necessarily move and change their direction in a similar manner. On reference to Maury's Wind Chart, it will be seen that the gales of wind, which are recorded to take place once at least in six days, reach as low a latitude as 25° N., from November until February in the northern hemisphere, but in the southern hemisphere, during the same months, they occur in such a small area that they need hardly be taken into consideration. As the direction of the northern storms is retrograde, the direction of the waves caused by these storms will be retrograde also. This is precisely the case with the rollers during this period. Again, from June until September the gales of wind prevail in the southern hemisphere, and the motion of these storms is direct; and I have observed that the rollers during this period follow the same law. This change in their direction was singularly exemplified last year by the occurrence of some extraordinarily heavy rollers, which commenced almost from the S.W. by South, and lasted about five or six days, changing their direction until they went down at N.N.W. There may, of course, be objections to the idea that they are caused by cyclones; but all I have wished to point out with regard to them is their coincidence in time and change of direction with these storms in each hemisphere.

With this the subject may be satisfactorily closed for the present, but any additional feature which may be elicited as to their occurrence, by which they might be predicted, would be of great importance.

IV.—TEMPERATURE, DENSITY, DEPTH, ETC., OF THE OCEAN.

The topics which will be briefly adverted to in this section are rather subjects of interest to the general enquirer, than directly useful to the mariner in his vocation. Still they are important in generalising the current and wind systems, which are so necessary to be known, and they will afford gratification in collecting the evidence, which in an aggregate sense leads to important results.

1.—TEMPERATURE AND DENSITY.

There is one singular fact, which appears to be gradually determined as observations on the specific gravity of the ocean water are multiplied; this is, that at a certain depth below the surface, beneath the effects of rain, evaporation, congelation, or the mingling of river waters, the density is very nearly uniform all over the world. This identity of constitution points to another conclusion—that the water of the ocean does circulate over and intermingle with every portion of the water surface of the globe, in the same way that the atmosphere is continually changing and passing over every part of the globe in turn, thus becoming of one universal character, capable of sustaining life in any and every part of the earth.

This subject is dwelt on more at length in our Memoir for the North Atlantic, page 314, &c., and will be only briefly discussed here. But there is one brief report on the collected observations on density (above 50,000 in number), which were sent to the Meteorological Department under the late Admiral FitzRoy. The means of these observations are shown upon a chart, which is of great interest to the physicist, and will help us to arrive at many important conclusions.

The mean specific gravity of the whole of the North Atlantic from the Equator to latitude 50° is 1·02664, while that of the South Atlantic between the corresponding parallels is 1·02676, showing an excess on the side of the waters South of the Equator, but only of ·00012.

The accession of the River Plate has considerable influence in diminishing the density of the sea in its vicinity, and by omitting all observations above 30° North and 30° South, the mean densities become respectively 1·0267 and 1·0271; that is to say, between the Equator and 30°, the southern waters are heavier than the northern by ·0004.

This difference is less than has hitherto been generally supposed, and even *this* exists only between the Equator and 20°, and is chiefly occasioned by the greatly diminished density of the water between the Equator and 10° N. in the belt of Equatorial calms and rains.

NORTH AND SOUTH ATLANTIC OCEANS.

50° North to 50° South.

Zones.	Means.		Maxima.				Minima.				Extreme Range.		Approximate Number of Observations.
	Specific Gravity at 62° F.	Temperature.	Specific Gravity.	Long. W.	Temperature.	Long. W.	Specific Gravity.	Long. W.	Temperature.	Long. W.	Specific Gravity.	Temperature.	
North.		°		° °	°	° °		° °	°	° °		°	
50° to 40°	1·0260	57·5	1·0304	30 to 40	79	30 to 40	1·0099[*]	St. Law.	32	50 to 60	·0205	47	4,000
40° to 30°	1·0271	67 0	1·0323	20 ,, 30	81	40 ,, 50	1·0239	30 to 70	49[†]	60 ,, 70	·0084	32	2,300
30° to 20°	1·0274	75·1	1·0312	40 ,, 50	85	70 ,, 80	1·0235	30 ,, 40	58	20 ,, 30	·0077	27	2,100
20° to 10°	1·0270	77·8	1·0313	20 ,, 30	83	20 ,, 30	1·0198[‡]	20 ,, 30	64	17 ,, 20	·0115	19	2,000
10° to 0°	1·0257	80·4	1·0318	20 ,, 30	84	20 ,, 30	1·0206[§]	50 ,, 60	74	20 ,, 30	·0112	10	3,000
South.													
0° to 10°	1·0270	77·4	1·0308	30 ,, 40	84	10 ,, 20	1·0159[§]	10 ,, 12	69	10 ,, 12	·0149	15	2,400
10° to 20°	1·0272	73·0	1·0311	30 ,, 40	83	30 ,, 40	1·0274	30 ,, 40	90	10 ,, 12	·0064	23	2,100
20° to 30°	1·0271	69·4	1·0318	30 ,, 40	83	30 ,, 40	1·0196	Rio.	56	20 ,, 30	·0122	27	2,600
30° to 40°	1·0265	62·3	1·0312	30 ,, 40	80	30 ,, 40	1·0185	20 ,, 10	45	0 ,, 10	·0127	35	3,700
40° to 50°	1·0260	51·2	1·0293	30 ,, 40	66	20 ,, 10	1·0226	20 ,, 10	33	0 ,, 10	·0067	33	1,400

[*] Near the entrance to the St. Lawrence, and affected by the fresh water.

[†] 33° is *said* to have been met with near the American coast in January.

[‡] After much rain. H M.S. *Boscawen*.

[§] The ship *Victory*, while trading on the African coast, found the specific gravity lower on several occasions—1·0164, 1·0130, 1·0129, 1·0167.

In a log kept by Admiral Sir Frederick Grey himself on the coast of Africa, there is the following passage: "At the surface of the water, after we anchored, the stream of brown Congo water prevailed generally, while at a little depth below the green salt water was seen, and the variations in density (by hydrometer) 1·0247, 248, 241, 202, depend on the eddies which sometimes brought up the water from below." At bottom—temperature 72°, density 1·0252; at surface—temperature 75·9°, density 1·0202.

Though but little *heavier* the South Atlantic is decidedly *colder* than the North by nearly five degrees, their mean temperatures being 71°·6 and 66°·7 respectively, and that this difference is tolerably uniform parallel for parallel is evident by the thermal curves that have been projected.

In illustration of the effect of heavy rains, in at least temporarily diminishing the specific gravity of the surface, a most remarkable instance was observed by Dr. C. K. Ord, of H.M.S. *Hermes*, when that ship was lying in Simon's Bay, in August, 1859. On the 4th of that month, at 9 a.m., the specific gravity was 1·0266, and in one hour it was reduced by the heavy rain that fell to 1·0193, the water becoming "brown in colour, merely brackish in taste, and its current setting distinctly outwards." By noon the density had increased to 1·0253, and at 3 p.m. the surface had recovered its former density of 1·0266. The next day the specific gravity was again reduced by heavy rain, and again rose. The *temperature* of the surface was also temporarily lowered from 58° to 55°, the temperature of the rain being 50°.

During the voyage of H.M.S. *Challenger*, a great deal of attention was devoted to the study of the temperature and specific gravity of the water of the Atlantic Ocean, as obtained on the surface and from various depths, a full account of which will be found in the interesting work by the late Sir C. Wyville Thomson (The Voyage of the Challenger, 2 vols., 1877), and from which the following few extracts are taken:

Bearing in mind that at a certain depth below the surface, varying only slightly in different regions, there is a thick belt of water at a nearly uniform temperature of 4° to 5° C. (39° to 41° F.), it is evident that the much higher temperature of the surface-layers must be due, for each position, directly or indirectly to the heat of the sun. Normally the surface-temperature would attain its maximum near the Equator, and would decrease uniformly towards the poles; and the very abnormal distribution of temperature which actually exists must depend upon some disturbing cause or causes. That several such causes come into play, and many complicated combinations of these causes, there appears to be little doubt; but one disturbing cause seems to be so paramount, so sufficient in itself to account for the observed phenomena, that I do not think it necessary in this preliminary sketch to pursue the inquiry beyond it.

The comparative thinness of the belt of warm surface-water in the Equatorial region is at first sight remarkable, and has given rise to a good deal of speculation. The phenomenon is essentially a continuation to the North of the Equator of southern conditions, and the small effect of the vertical sun in raising the temperature to any depth below the surface is doubtless due to the removal of the heated layer as soon as it is formed by the trade winds and their counter-currents, and to the rapid abstraction of heat in the formation of watery vapour.

One of the best-marked and most important phenomena of the distribution of temperature in the upper layers of the Atlantic is the steady increase in the volume of warm water from the South northwards. For example, between Montevideo and Tristan d'Acunha we find the isotherm of 7° C. (44·3° Fahr.) at an average depth of about 250 fathoms, along the Equator at under 300 fathoms, between Teneriffe and Sombrero it occurs at a depth of 500 fathoms, and between Bermudas and Madeira at about 600 fathoms; the principal accumulation of warm water, at depths below 400 fathoms in the North Atlantic, is to the eastward.

Shallow as the stratum of water forming the ocean is—a mere film in proportion to the radius of the earth—it is very definitely split up into two layers, which, so far as all questions concerning ocean movements and the distribution of temperature are concerned, are under very different conditions. At a depth varying in different parts of the world, but averaging perhaps 500 fathoms, we arrive at a layer of water at a temperature of 40° F., and this may be regarded as a kind of neutral band separating the two layers. Above this band the temperature varies greatly over different areas, the isothermobathic lines sometimes tolerably equally distributed, and at other times crowding together towards the surface, while beneath it the temperature almost universally sinks very slowly and with increasing slowness to a minimum at the bottom.

One of the most singular results of these investigations is the establishment of the fact that all the vast mass of water, often upwards of 2,000 fathoms in thickness, below the neutral band, is moving slowly to the northward; that in fact the depths of the Atlantic, the Pacific, and the Indian Oceans, are occupied by tongues of the Antarctic Sea, preserving in the main its characteristic temperatures. The maintenance of a low temperature while the temperature of the floor of the ocean must be higher, and that of the upper layers of the sea greatly higher, is in itself a conclusive proof of the steady movement of the water from a cold source; and the fact that the temperature of the lower layers of water, both in the Atlantic and the Pacific, is slightly but perceptibly raised to the northward, while the continuity of every layer with a corresponding layer in the southern sea can be clearly traced, indicates the southern position of that source.

Dr. Carpenter says: There is a marked difference between the Bottom-Temperatures of the *western* and of the *eastern* portions of the South Atlantic seabed; that of the latter, between Tristan d'Acunha and Ascension Island, nowhere falling below 35°·3, though between Ascension Island and the Equator there is a narrow but deep stratum of water ranging downwards between 35° and 32°·7, which must obviously be an extension from the Antarctic basin. This extension is clearly traceable on the line between Tristan d'Acunha and the Cape of Good Hope; the bottom-temperature ranging downwards to 32°·9, and a considerable thickness of abyssal water having a temperature below 35°.—Now this distribution of abyssal temperatures is precisely conformable to the contour of the sea-bed; for the "Dolphin Ridge," which divides the North Atlantic into an eastern and a western basin, seems to have its parallel in the "Challenger Ridge" of the South Atlantic; the two being connected by an oblique ridge that lies about halfway between the Guiana Coast and the opposite Guinea Coast. And while the *western* basin is in free communication with the Antarctic, so that its glacial water flows northwards until checked by the "Connecting Ridge," the deep communication of the Antarctic with the *eastern* basin is so far interfered with, that very little of the glacial water of the former can find its way along the bottom of the latter, which consequently receives only the coldest that can flow over the ridges.

The question of the dynamical effect of temperature on the ocean, and of its relation to the density of the water, has been carefully discussed in the United States' Meteorological Bureau, and Capt. Maury endeavoured to ascertain by direct experiment what the amount of this effect was. He had delicate thermometers made, by which to estimate the relative increase in volume of sea-water with the well-ascertained increase in mercury at varying temperatures, and thus to arrive at some hitherto occult law which might govern the motion of the great mass of ocean water, or of some portion of the changes which are at present hidden in the greatest obscurity. But it may be fairly but deferentially questioned, whether the minute means employed were in any way commensurate with the vast problem they had to solve; whether the existence of a minute amount of air in the water might not invalidate their results, and give rise to conclusions more in error than the quantities they are intended to eliminate. The idea obtained was that there is a thermal tide which ebbs and flows but once a year.

One of the most important works which have appeared on the surface temperature of the South Atlantic, is the "Investigations with the Sea-thermometer," published by the Netherlands Royal Meteorological Institute* in 1861, and with this has been combined the observations collected by our Board of Trade under Admiral FitzRoy and his successors. From the English work, published in 1869, we give the following :—

In the extraction of the observations from the English registers kept on board ship, no notice had been taken of the exact positions of the respective ships, beyond the fact of their being within the area of a certain five-degree square.

The Dutch discussions have been effected with reference to bands of 5° of longitude, but for single degrees of latitude, so that five distinct means are given for the space which is only represented by a single mean in our own results. This is of course a very great improvement; but even this subdivision is far from being minute enough to enable us to trace satisfactorily the direction of the ocean currents. It is evident that in order to investigate currents running in a meridional direction, each observation must be examined to the full as closely with reference to the longitude as to the latitude of the spot where it was taken.

In addition to their monthly charts, the Dutch have published charts showing the course of the isothermal lines for surface temperature in the hottest and coldest months of the year. As is well known, these do not coincide with mid-summer and mid-winter, but fall much later, being in fact March and September in the southern hemisphere. In the publication of the "Pilot Charts for the Atlantic Ocean" by the Hydrographic Office of the Admiralty, the chart of stream and drift currents with the surface temperature, which forms part of that series, exhibits the course of several of the isotherms in summer and winter, and, as all available sources of information were used in its preparation, a re-publication of these lines seems unnecessary.

The remarks on the course of the lines in question which accompany the Dutch charts are so clear and concise that the Committee consider they can scarcely do better at present than reproduce them.

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* Onderzoekingen met den Zee-thermometer. Utrecht, 1861.

Extract from Onderzoekingen met den Zee-thermometer, page 49 :—

When we compare the position of the isothermal lines corresponding to the several parallels of latitude, North and South of the Equator, we notice immediately that there is a great difference between the temperatures of the North and South Atlantic Oceans.

In the northern hemisphere it is shown that in the warmest month of the year the isotherm of 77° F. (25° C.) between the meridians of 80° and 30° W. (i.e. over the greater portion of the ocean) lies between the parallels of 30° and 34° North latitude, and that it is only in the eastern portion, between the meridians of 30° and 15° W., that it reaches the latitude of 17° N.

In the southern hemisphere, on the other hand, we meet the isotherm of 77° F. (to the eastward of the meridian of 20° W.) as soon as we reach the parallel of 13° South latitude, while it is only to the westward of the same meridian (i.e. over a very small portion of the ocean) that it is found at the mean latitude of 30° S.

The difference between the two hemispheres as to the position of the isotherm of 68° F. (20° C.) is quite as remarkable.

In the northern hemisphere we have seen that during the warmest months it runs in an easterly direction from Cape Hatteras to Cape Finisterre, and accordingly lies between the parallels of 42° and 44° N.

In the southern hemisphere the mean course of the same isotherm during the warmest months is along the parallel of 37° S., and between the meridians of 5° and 10° E. it even sends a bend northwards, so as to reach the parallel of 30° S.

If we examine closely the sea temperatures observed North and South of the Equator, and compare the mean values obtained from each month, we find that the temperatures observed North of the Equator are always much higher than those observed to the South of it. We consider this investigation the more important because the colder character of the water in the southern hemisphere can only be proved by the position of the isothermal lines with reference to the Equator.

Let us now proceed to inquire into the extent of the annual range compared with that for the northern hemisphere.

The isothermal line of 77° F. which we found in summer at the mean latitude of 39° N., in the western portion of the North Atlantic Ocean, sinks in winter to the parallel of 16° N., and thus comes 23° nearer to the Equator.

In the summer of the southern hemisphere the isotherm of 77° F. never descends to the South of the parallel of 30° S. westward of the meridian of 20° W., except between the meridians of 50° and 45° W., where it reaches a maximum latitude of 35° S. In the eastern part of the ocean it scarcely reaches the parallel of 13° S. In winter the same isotherm approaches the Equator to the parallel of 13° S. West of the meridian of 25°, while in the eastern portion of the ocean it even crosses the Equator, and is found some degrees to the North of it.

Thus on the average, in winter, this isothermal line lies in the latitude of 6° S., and the total amplitude of its variation in position is 17°.

The slight amount of annual variations in position of the isotherms of 59°, 50°, and 41°, is especially deserving of notice, and also their decrease as we reach higher latitudes, so that the isotherms of 50° and 41° only oscillate through a distance of 4 or 5 degrees of latitude. Accordingly, to the southward of the parallel of 42° S., summer and winter climates differ but little from each other, whilst in the neighbourhood of the South point of South America the climate is distinguished by its increased mildness in winter.

Thus we see that the corresponding isotherms in the northern hemisphere oscillate in position to a greater extent, and on the whole lie at a greater distance from the Equator. In the southern hemisphere, on the contrary, they oscillate to a less extent, and lie nearer to the Equator. The sea to the South of the line is thus decidedly colder, and accordingly the central line of the belt of warmest water does not coincide in position with the Equator, but lies for the most part to the northward of it. We see then that the climatological Equator must of necessity, at all seasons, lie a few degrees North of the geographical Equator. It is self-evident that the line which divides the two hemispheres climatologically shifts its position according to the seasons; but all these changes of situation take place to the North of the Equator, except in February and March, when this line has its most southerly position, and the Equator is crossed in a few places.

If we keep in mind what has been already published in general terms with reference to the distribution of temperature on the earth's surface in the short sketch of the theory of the winds,* we do not require to go into any particulars to show that the smaller lateral extension of the continental masses in the southern hemisphere is the principal cause why the waters in the South Atlantic are on the whole colder, and that the sea cannot exhibit the remarkable differences of temperature at the various seasons which meet us in the North Atlantic.

It deserves special notice that the South Atlantic Ocean is much colder to the East of the meridian of 20° W. than to the West of it.

All the isothermal lines take a sudden bend southwards in the neighbourhood of this meridian. This change in direction takes place even in summer, but at that season its place lies more to the westward, near the meridian of 25° W.

We see here, as in the North Atlantic, that there is a cold current flowing northwards along the coast of Africa, and a warm current flowing southwards along the coast of Brasil; we find from the monthly charts that the Brasilian Current, which we may consider as a southern branch of the Equatorial Current, splits into two parts in the neighbourhood of the parallel of 30° S. One portion flows in a south-easterly direction, and loses itself, after throwing off several branches, in the polar current; the other portion flows by Patagonia and the Falkland Islands, and exerts such a warming influence on the climates of these countries in spite of their high southern latitudes, that the numerous herds of black cattle, horses, and sheep which roam over the plains can find abundant nourishment even in the winter time.

The South polar water which we see flowing past the Gulf of Guinea is warmed on its way; the coast line forces it to assume a westerly course, and it is to this source that we are indebted for the warm water which we find flowing in a northerly and southerly direction along the western shores of both oceans, and not to the Agulhas Current, which can only send its waters during a few months of the year to the West of the South point of Africa. The very low temperatures found in the eastern portion of the ocean prove this statement completely. Between the meridians of 20° and 15° E. we see that the warm current shows itself very distinctly at lat. 35° S., while its influence is no longer noticeable as soon as we come to the northward of 33° S.

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* *Vide* Maandelijksche Zeilaanwijzingen, 1860, pp. v. and vi.

The temperature charts show us also the cold polar current, which is often covered by streaks of warm water which come forth from the Brasilian Current, and on the African side from the Agulhas Current; of this there is abundant proof in the charts.

The first locality in which considerable alterations of temperature are met with is almost exactly on the Equator, about the 23rd meridian of West longitude. At this spot, in the month of July, Capt. Code, in the *Orient*, reports that the temperature fell 5°, and rose again in the space of 24 hours, the water appearing of a light green colour.

Admiral Sir F. Grey noticed very remarkable changes of temperature on the coast of Africa between the parallels of 10° and 20° S., in the month of May. He observed the surface temperature below 60° on two occasions when he was about 25 miles off shore, and he remarks—"It would appear that the temperature of the water decreases as we approach the shore." The charts show a striking discrepancy between the mean temperature of the square in question, which is 60°.8, and that of the squares to the North and South of it, which are 76°.3 and 62°.2 respectively.

We now come to the district bounded by the meridians of 10° E. and 40° E., and lying between the coast of Africa and lat. 50° S. In this region most sudden and remarkable alterations of temperature are met with at all seasons of the year.

Changes of temperature have been observed by some homeward-bound vessels between the parallels of 35° and the coast when crossing the Agulhas Bank, and Capt. Toynbee remarks, that the temperature of the water is a good guide to show whether you are on the bank or not.

However, by far the greater number of the extracts refer to a region lying 1 or 2 degrees on either side of the 40th parallel of latitude. In the northern part of this belt the observations all fall to the eastward of the meridian of 10° E., but in the southern part it will be seen that in a few instances considerable alterations of temperature have been noticed as far West as the 8th or 9th meridian of East longitude.

Throughout the whole of this area the alternations of cold and warm water are most striking, and the changes of temperature are nearly as sudden and as great as those well known to be experienced on the northern edge of the Gulf Stream, where it is bounded by the Arctic Current. The greatest actually observed has been a fall of 19°.5 in one hour, recorded by Capt. Major in the month of February. His position was in 41° 38′ S., and 21° 30′ E., and the surface temperature was observed to be 69°.5 at 9 a.m., 50° at 10 a.m., and again 69°.5 at noon.

Another region where sudden changes are noticed is off the coast of South America, from the 20th parallel of South latitude southwards, and there are several well-marked areas, notices of which will be found in the extracts from the registers.

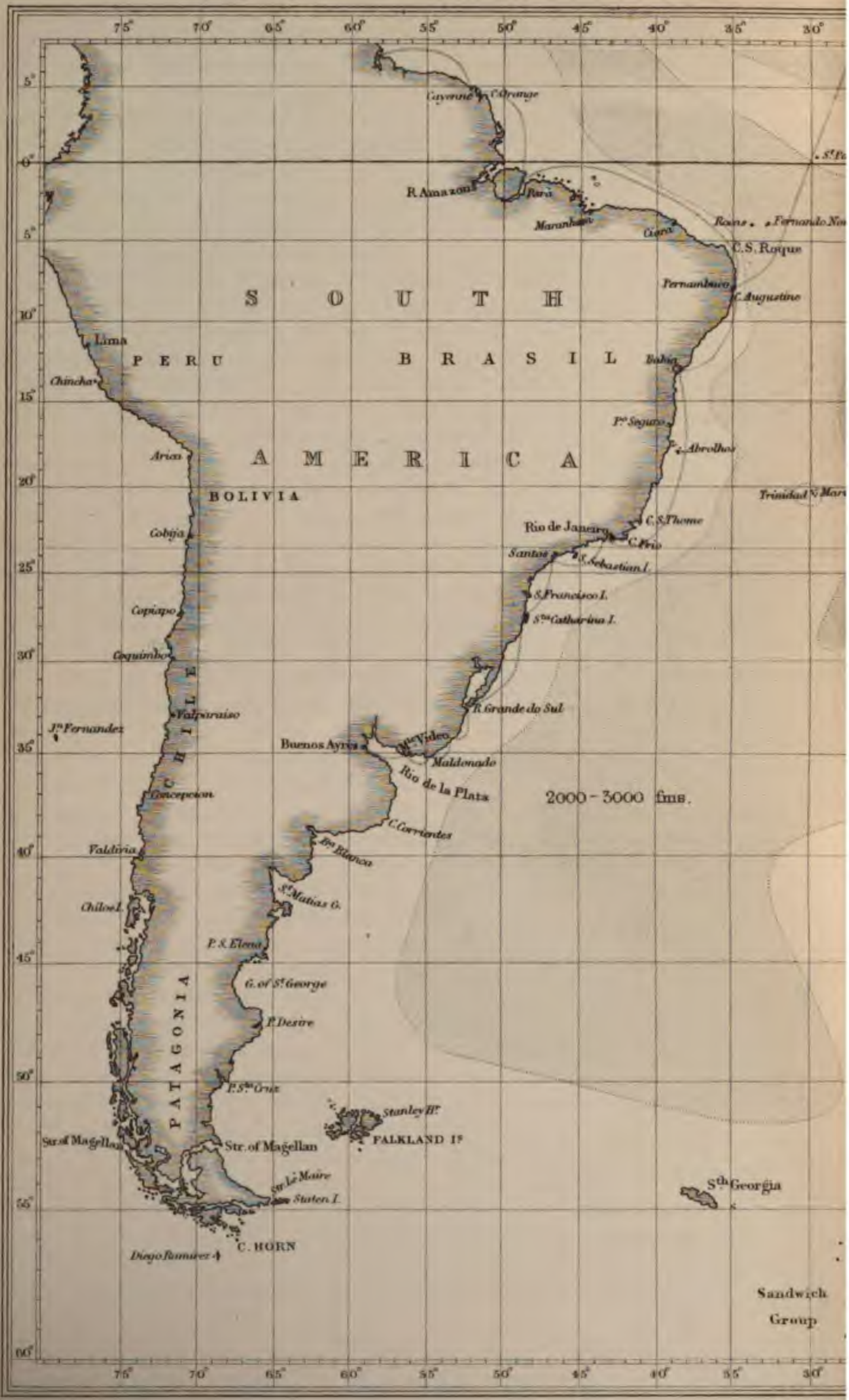
It appears from the additional notes, that colder water is to be met with off Rio Janeiro inside the line of soundings than outside. This would appear to show that the branch of the Equatorial Current of warm water which flows southwards along the coast of Brasil is usually unable to force its way into the shallow water on the bank of soundings, along which a narrow stream of colder water flowing northwards is met with. The difference is greatest in February, when it exceeds 4°. However, in July and August the conditions are quite changed, for then the temperature outside soundings is lower than inside.

When we come South of the parallel of 30° S. the changes of temperature which are noticed, though not so striking as those observed off the African coast, are yet very remarkable. The entire area in which the observations are made lies West of the meridian of 50°. Between the parallels of 35° and 40° S. changes of temperature of 20° within 12 or 14 hours have been repeatedly observed, with great variations in the colour of the water. As regards the relation of the currents to the depth of the water, Capt. James Gales states, "The warm water is on the bank of soundings, the cold along the edge of it." This is a marked difference to the state of things noticed off Rio Janeiro. However, this cold water forms only a narrow strip, for to the eastward again the water is decidedly warmer. When we pass the parallel of 40° S., the charts show that the mean temperature in lat. 40° to 45° S. is higher between 50° and 55° W. than in either of the squares situated East or West of it. The mean annual difference of temperature is 1°.8 to the eastward, and as much as 5°.4 to the westward. One observer, Capt. James Brack, cuts across this warm water in September, going westward. In lat. 41° to 44° S., long. 54° W., he finds an increase of 13° in 14 hours, succeeded by a decrease of 14° in 10 hours. The same observer had previously passed through a cold current in lat. 40° S., long. 53° W.

Another area, frequently referred to in the extracts, is that bounded by the parallels of 45° and 50° S., and the meridians of 47° to 53° W. Here the differences of temperature are not very great, but there appears to be evidence of the existence of two currents, a cold and a warm one, close to each other. The edge of a warm current is frequently noticed at about the 51st meridian, between the above-named latitudes, while the cold current appears to extend, at least in lat. 49°, from that meridian eastwards to that of 46° W., as many observers report a sudden fall in temperature about long. 47° W. Off Cape Horn a warm current close in shore has been commonly noticed. Capt. James Gales, in March, remarks, when the sea temperature rose 2°.4, "Standing northward, and temperature of the sea increasing. In dark or thick weather, that increase in the temperature of the sea would be a hint to tack a ship." The observation was taken about 40 miles South of Cape Horn.

The whole of this coast of South America seems, even from the small amount of information which has been attainable relating to it, to present features of interest as regards the sea surface temperature observed along it, which are, perhaps, equal in importance to those of the Agulhas Current.

Much additional information on the temperature, &c., of the water of the ocean at various depths, will be found in the reports of the investigations made during the voyage of H.M.S. *Challenger*, by Captains Nares and Thomson, Staff-Commander Tizard, and the late Professor Wyville Thomson.



75°
70°
65°
60°
55°
50°
45°
40°
35°
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0°
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15°
20°
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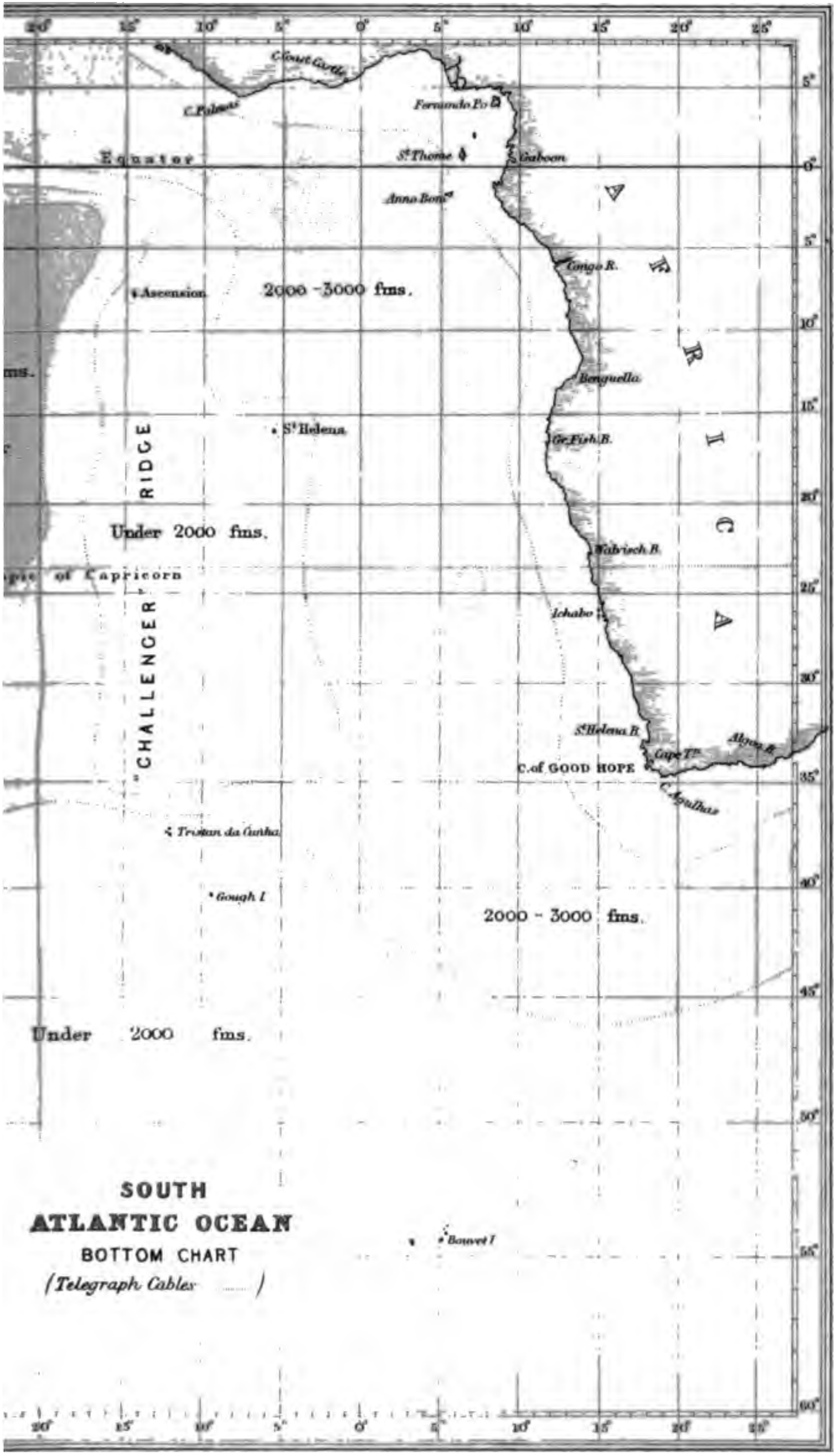
S O U T H
A M E R I C A
PERU
BRASIL
BOLIVIA
CHILE
PATAGONIA
Cayenne
C. Orange
St P
R. Amazons
Para
Maranham
Ciara
Rocas
Fernando No
C.S. Roque
Pernambuco
C. Augustine
Lima
Chincha
Bahia
Pto Seguro
Abrolhos
Arica
Trinidad
N. Mar
Cobija
C. S. Thome
Rio de Janeiro
C. Frio
Santos
S. Sebastian I.
S. Francisco I.
Sta Catharina I.
Copiapo
Coquimbo
R. Grande do Sul
Valparaiso
Jn Fernandez
Buenos Ayres
Mte Video
Maldonado
Rio de la Plata
2000 - 3000 fms.
Concepcion
C. Corrientes
Valdivia
Ba Blanca
St Matias G.
Chiloe I.
P. S. Elena
G. of St George
P. Desire
P. Sta Cruz
Stanley Hr
FALKLAND Is
Str. of Magellan
Str. of Magellan
Str. Le Maire
Staten I.
Sth Georgia
C. HORN
Diego Ramirez
Sandwich
Group

R. H. LAURIE, 53,


SOUTH
ATLANTIC OCEAN
BOTTOM CHART
(Telegraph Cables ......)
C. Coast Castle
C. Palmas
Fernando Po
St. Thome
Gaboon
Equator
Anno Bon
AFRICA
Congo R.
Ascension
2000 - 3000 fms.
ms.
Benguella
St. Helena
Gr. Fish B.
"CHALLENGER" RIDGE
Under 2000 fms.
Walfisch B.
Tropic of Capricorn
Ichabo
St. Helena B.
Algoa B.
Cape Tn.
C. of GOOD HOPE
C. Agulhas
Tristan da Cunha
Gough I.
2000 - 3000 fms.
Under 2000 fms.
Bouvet I.
20°
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60°

.ET. LONDON.

2. DEPTH OF THE OCEAN.

The experiments that have been made for ascertaining the depth of the South Atlantic have been much less numerous than those to the North of the Equator, and those recorded are much less conclusive. In the North Atlantic Memoir, 1879, pages 812—821, the particulars and list of the soundings which have been made North of the Equator, have served another purpose in Atlantic hydrography—they have disproved the existence of by far the greater number of reported shoals and dangers, to test which many of them were made. In the South Atlantic, on the other hand, these vigias and vaguely-determined rocks are very few in number, and the deep sea lead has not been completely applied to their verification and disproof.

Notwithstanding the former careful experiments which have been made on the South Atlantic, our conviction is, that they are all, or almost all, of a negative character: that is, that the enormous length of line run out in some cases does *not* show the true depth of the ocean.

This doubt we have expressed and assigned reasons for in other places, and it may here be briefly stated that the lead, in most cases, has apparently drawn out the line at very irregular intervals, which a spherical shot would not do, and it is more than probable that the bottom has been reached very much within the depth apparently shown by the sounding line. For if it should pass through one or more opposing submarine streams, which it is tolerably certain that it would do in some greater or less degree, this movement of the water would carry the line off the reel with double its velocity, or, in many cases, with a speed quite equal to that with which it would be drawn by the sounding weight. Also, that the impact of a moving mass of water upon a line whose sectional area is equal to 50 square feet per 1,000 fathoms would be vastly greater than the force exerted upon it by a sounding weight, which would consequently be drifted away by the line. The friction of a tortuous line, its buoyant power, and other reasons also, may be brought forward to invalidate the conclusions drawn from these experiments.

It may therefore be stated, that when the line at these great soundings does not run out with a regularly decreasing rate, that some other cause is in operation to cause this irregularity, and that it does not show the true depth. Besides this, the *exact* drift of the ship or boat should be taken into account, as any motion from the true perpendicular will cause the resulting depth to be not the hypothenuse of a right-angled triangle, whose base is equal to the drift, but the perpendicular to the base and a *curve* formed by the sounding line.

In the North Atlantic Memoir, above quoted, this subject is given more at length, and details of numerous experiments will there be found, including the results obtained in the most important voyage that has yet been undertaken in connection with this branch of science, that of H.M.S. *Challenger*.

The illustrative diagram will give the most comprehensive view of this subject. The form of the sea-bed of the Atlantic Ocean is thus described by Sir C. Wyville Thomson:—

Combining our own observations with reliable data which have been previously or subsequently acquired, we find that the mean depth of the Atlantic is a little over 2,000 fathoms. An elevated ridge, rising to an average height of about 1,900 fathoms below the surface, traverses the basins of the North and South Atlantic in a meridianal direction from Cape Farewell, probably as far South at least as Gough Island, following roughly the outlines of the coasts of the Old and the New Worlds.

A branch of this elevation strikes off to the south-westward about the parallel of 10° N., and connects it with the coast of South America at Cape Crange, and another branch crosses the eastern trough, joining the continent of Africa probably about the parallel of 25° S. The Atlantic Ocean is thus divided by the axial ridge and its branches into three basins: an eastern, which extends from the West of Ireland nearly to the Cape of Good Hope, with an average depth along the middle line of 2,500 fathoms; a north-western basin, occupying the great eastern bight of the American continent, with an average depth of 3,000 fathoms; and a gulf running up the coast of South America as far as Cape Orange, and open to the southward, with a mean depth of 3,000 fathoms.

The nature of the bottom.—Except in the neighbourhood of coasts, where the deposit at the bottom consists chiefly of the débris washed down by rivers, or produced by the disintegration of the rocks of the coast-line, the bed of the Atlantic, at depths between 400 and 2,000 fathoms, is covered with the now well-known calcareous deposit, the "Globigerina-ooze," consisting to a great extent of the shells, more or less broken and decomposed, of pelagic foraminifera. In the Atlantic the species producing the ooze are chiefly referable to the genera *Globigerina*, *Orbulina*, *Pulvinulina*, *Pullenia*, and *Sphæroidina*, the two latter in smaller proportions.*

Of the relation between the depth and the rate of the propagation of the tidal and storm waves, it will be needless to speak, as our knowledge is much too limited to be brought to bear on those topics. We have satisfactory examples of the nature of the bottom, which has been found to be of such surpassing interest to the naturalist, consisting in some parts almost exclusively of living organisms, as described in the "North Atlantic Memoir," 1879, pp. 830—831.

3. ANIMAL LIFE, ETC.

"The curious on board ship sometimes amuse themselves by letting overboard, in light winds and calms, a hoop-net of gauze, or other light material, to 'catch insects of the sea;' crumbs of bread or other food that will attract them are sometimes placed in it as bait. The hoop is to keep the mouth of the net open, and prevent it from collapsing into folds and crushing its spoils as it is hauled up: and these, when they are received on deck, are regarded by all on board with amazed interest and curiosity.

"But wait until the microscopist mounts them on his slides, and brings the powers of his instrument to bear. Then every one who looks marvels at the beauty and variety of organic form there presented, and the beholder is at once struck with the extent, resources, and the richness of the new field of research, into which he has now, it may be for the first time, had the opportunity of casting a look. He fully realizes the idea that the organisms of the sea are as multitudinous as its waves, and as marvellous as its wonders.

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* Voyage of the *Challenger*, vol. ii, pp. 290—291.

"With such a subject for study and contemplation as these insects afford to all who can use the microscope, let no naturalist who crosses the ocean, and no passenger on board ship, or mariner, who can afford to purchase a microscope, talk hereafter about the monotony of a sea voyage, or the *ennui* of a passage. More varied, strange, and new than the insect life of *terra firma*, the entomology of the sea, if we may so style the families of its little crustaceæ, medusæ, and zoophytes, offers quite as profitable and as instructive a field of investigation as does the entomology of the air.

"The floating crustaceæ of the high seas are classed by naturalists a little lower than the insects of the air, yet, in the scale of being, they rank higher than the worms of the earth. Every one who, with an eye for the microscope, goes to sea, may help, with proper drawings and descriptions of what comes to his net, greatly to enrich this field. Not only so, these mites of moving creatures will tell us in their mute way, if we consult them aright, of all the currents, polar and equatorial, that help to regulate the climates of the great deep. They may be regarded as tallies to the water by which the system and channels of oceanic circulation are to be pointed out and made visible, as it were, to the eye of science."—*Capt. Maury.*

This "*New Field*," as it is termed by Maury, can be readily explored by any one who will take the trouble to do so. A simple contrivance, if a microscope is not at hand, will afford the means. The eye-piece, or first joint of an ordinary telescope, is a very good substitute. To use it for the transparent objects, which the minute inhabitants of the surface waters generally consist of, place them in a drop of water on a piece of glass, held or fixed horizontally a few inches above a sheet of white paper or a looking-glass, and the telescope joint held by the lower part at from a quarter to half an inch above the surface of this glass, will make an excellent microscopic tube of great power, sufficient to show many of the singular forms and great beauties of the animalculæ, which can be easily collected in vast numbers.

The best or readiest way of obtaining them is to tow a small net, consisting of a hoop, one, two, or three feet in diameter, on which is strained a piece of bunting or fine gauze, and this being drained occasionally into a vessel, will afford an abundant harvest. The floating weeds also contain great quantities of minute living creatures, which may be taken by the same means.

It would be entirely beyond the province of this work to deal with the characteristics and families of these inhabitants of the seas, although much good may be done, hydrographically, by the study of their distribution. This subject must be pursued in other works, although unfortunately they are generally of a very expensive character. We have given some brief notices of it in our "North Atlantic Memoir." In the eighth edition of Maury's Sailing Directions is given an extensive series of coloured drawings and descriptions of some of the specimens taken on board Capt. Toynbee's famous ship *Gloriana*, from the pencil of his accomplished lady, the daughter of the late Rear-Admiral Smyth, to whom this work was originally dedicated. Maury published the following letter, which accompanied these drawings:—

"Ship *Gloriana*, en voyage, January, 1857.—My dear Sir: Your very welcome and kind letter was awaiting us when we landed in Madras last month, for we had left England a day or two before it arrived. I assure you it was with sincere pleasure that Captain Toynbee heard that his logs were likely to be useful to you, for it is a grand thing to contribute even in the smallest measure to your excellent and noble work. The log this voyage will comprise a little further experience of the Indian Seas; for we came up the Bay of Bengal in company with a cyclone, making use of it till the furious squalls and disturbed sea warned us to stop, and most surprised all the passengers were when they heard the order given to heave-to, and to learn what it was that we were to avoid. Capt. Toynbee had confided his suspicions of our terrible neighbour to me for some days, and most interesting I had found it to watch the gradual changes of wind which were to prove the truth and importance of the circular theory; and when we were the first ship to anchor in Madras Road, all that had been there before having been obliged to put to sea, the chorus of praise on this simple but effectual nautical science was universal.

"We have since found that on a night while we had theatricals performing on board in the open air, a ship only 195 miles from us was exposed to all the fury of the wind, sea, and rain; whilst four ships on shore, and, more dreadful still, the wreck of a vessel's stem, formed into a raft—but with no men on it—completed the horrors of the day; all this, however, is described at length in the log, and that will tell you, too, that the rest of our voyage was rough, rough outwardly, but smooth and pleasant inwardly; for both the passengers and the detachment of the 19th Lancers on board seemed to vie with each other in smoothing over the discomforts of high seas and incessant rain; * * * * indeed, we thought that the rough weather seemed just to afford that relief from the monotony and *ennui* of a long voyage, which people in general will not look for in occupation. As for ourselves, we have found a new and most engrossing interest in sea life in examining the sea water with the microscope, of the results of which we have since found that you give specimens in the last edition of your Sailing Directions. Unfortunately, Capt. Toynbee had not reached the appendix in looking through it before leaving home, else we should have provided ourselves properly for carrying on the search. The surgeon of the Lancers, Mr. Wrench, luckily had his microscope with him, and was enthusiastic and skilful in the use of it, and he and my husband used to spend many hours at first trying to catch these delicate organisms. 'Oh,' Mr. Wrench sighed, 'if I had but a test tube here.' A hydrometer had been accidentally broken a few days before, and supplied the very thing we wanted, and then all went on prosperously; each day exciting in us more and more admiration for the marvels around us. That rough foaming sea to abound with this minute life, exquisitely coloured, and each of the many legs of the little crustaceæ beautifully feathered and fringed, seemed a wonder of which we could never tire; and much as we liked Mr. Wrench personally, our regret when he left us was much increased by his microscope going with him. He is already at work with it on the fresh water insects in Poonamalee, whilst a kind friend in Madras has lent us his, so that the bucket of water drawn for trying the surface temperature is a perpetual feast. We shall be very much interested in hearing whether the sketches we shall send you resemble those you have had from elsewhere. I fear I am taking up too much of your precious time with my long letter, but it is

a real treat to speak, even on paper, to anyone who thoroughly appreciates the grandeur and glory of the sea. What new lights you have thrown upon it in your Physical Geography, and how shall I thank you sufficiently for that charming work? We rewarded Mr. Wrench for his microscropic work by letting him read it, and he agrees with us in the dignity and sublimity of its views. * * * * * * *
Believe me, your truly obliged, Ellen P. Toynbee."

In Sir C. Wyville Thomson's work on the Voyage of H.M.S. *Challenger* in the Atlantic Ocean are numerous illustrations of different forms of animal life as existing on the surface, and at various depths, to which we must refer the reader for further information on the subject. We, however, here give the general conclusions at which he arrived.

"The most prominent and remarkable biological result of the recent investigations is the final establishment of the fact that the distribution of living beings has no depth limit; but that animals of all the marine invertebrate classes, and probably fishes also, exist over the whole of the floor of the ocean. My present impression is although life is thus universally extended, the number of species and of individuals diminishes after a certain depth is reached, and that at the same time their size usually decreases."

Luminosity of the Sea.—The luminous appearance of the sea at night has often been the subject of wonder and reflection. This light, when excited by the ship's rushing through the water, assumes the form of brilliant stars, or round masses of greenish hue, frequently 18 inches in diameter. They float by the vessel in every part of the water where her bottom has touched, as deep as the very lowest part of the keel, and form behind her a long and fiery train. At other times, when the breeze is strong, and the billows break and foam, this light appears like fields of flashing fire. Twice, says Mr. Luccock, I have beheld this latter sight in all its splendour; the water was highly luminous, so far as the eye could reach, and the vessel seemed to be plunging her way over billows of liquid fire. In both instances the night was dark and lowering; and the brilliance of the water formed a grand but awful contrast with the black concave above us. When daylight returned, all this heatless splendour was eclipsed, and the sea exhibited, to a superficial view, only a more dingy colour than usual; to a more close examination, it presented myriads of hemispherical bodies of the medusa tribe.

This luminous appearance arises from the presence of several kinds of animated beings, which have the power of emitting a phosphorescent light. This is evident, from the multitude of them which may be taken out of the sea, and still appear lucid and active. Another great cause may probably be found in the disorganization and putrefaction of animal substances; this light abounding on all beaches where the refuse of large cities is discharged. Friction, in most cases, seems to assist in the production, if it be not in all essential to the existence, of this brilliancy. The slight agitation of the water, occasioned by the action of a steady breeze upon its surface, is often sufficient for the purpose; and in cases where plants are taken up, inhabited by minute animals, exposure to the passing air alone seems to be enough.

That this luminous quality is not confined to the surface of the water, where for the most part it appears in the English Channel and North Sea, is evident to all who have passed the tropics, and may be clearly proved to those who have not; for the shark, when he has taken the bait at night, and finds himself hooked, generally plunges downward, if line enough be given, many fathoms below the bottom of the vessel, and is visible even there by the light which he creates around himself, while floundering in the water. That the light in question does not proceed from his own body, but from the water which he agitates, or rather the matter which it contains, is manifest; because the larger living fishes, as they dart around and beneath us during the obscurity, leave behind them long lucid trains, just of the same kind, and in the same manner, as the vessel herself does.

Discoloured Water.—Mr. Luccock says, " In fine weather, near the Coast of Brasil, the ship frequently falls into *patches of water*, which exhibits a *brown and dirty appearance*, for several miles in extent. Strangers are apt to suppose that they are on the edge of a shoal; and more than once, he adds, I have seen the helm put hastily down, in order to avoid the supposed sand-bank. Yet the brownness of the water arises from the spawn of fishes: and when examined by a microscope, or powerful lens, is found to be mingled with vast numbers of the small fry, which have just broken into active existence. They seem to have been deposited by their parents during the winter months; for I have noticed them from June to November, but not in March, April, nor May. They probably serve as food for those fishes which are more fully grown, or the ocean soon would be overstocked."

Upon this passage, Lieut. A. H. Bisschop Greevelink remarks, " I should question, with all deference, whether the depth of water in such places was tried to a sufficient degree of certainty.

" On our passage from the West Indies to Europe, in July, 1837, at about four in the afternoon of the 7th, a streak was observed on the surface of the sea, exactly in the same manner as Captain Kotzbue describes; and at the moment we passed over it, the lead was hove in a very proper manner, without finding bottom; but having lowered the boat, soundings were found to exist, although in more than 30 fathoms water. The latitude, computed from observations taken at noon, was 21° 12′ N., and longitude, by chronometer, 58° 42′ W."—See further on this subject, our North Atlantic Memoir, 1879, pp. 807—812.

Although it is undoubtedly the case that discoloured water is an indication of shoal water, still in almost every long voyage some of this phenomenon is met with, far beyond the limit of soundings. We will subjoin a few extracts from the Journal and remarks of Charles Darwin, Esq., M.A., Sec. Geol., &c., on this subject.

" March 18th, 1842, we sailed from Bahia. A few days afterwards, when not far from the Abrolhos Islets, my attention was called to a discoloured appearance in the sea. The whole surface of the water, as it appeared under a weak lens, seemed as if covered with pieces of chopped hay, with their ends jagged. One of the particles measured .03 of an inch in length, and .009 in breadth. Examined more carefully, each is seen to consist of from twenty to sixty cylindrical filaments, which have perfectly rounded extremities, and are divided at regular intervals by transverse septa, containing a brownish green flocculent matter. The filaments must be enveloped in some viscid fluid, for the bundles adhered together without actual contact. I do not know to what family these bodies properly belong, but they have a close resemblance in structure to the confervæ which grow in every ditch. These simple vegetables thus constituted for floating in the open air, must in certain places exist in countless numbers. The ship passed through several bands of them, one of which was about 10 yards wide; and, judging from the mud-like colour of the water, at least 2½ miles long. In almost every long voyage some account is given of these confervæ. They appear specially common in the sea near Australia. Off Cape Leeuwin I found some very similar to those above described; they differed chiefly in the bundles being rather smaller, and being composed of fewer filaments. Capt. Cook, in his third voyage, remarks that the sailors gave to this appearance the name of 'sea sawdust.'

"I may here mention that two days preceding our arrival at the Keeling Islands, in the Indian Ocean, I saw in many parts masses of flocculent matter of a brownish green colour, floating on the sea. They varied in size, from half to 3 or 4 inches square; and were quite irregular in figure. In an opaque vessel they could barely be distinguished, but in a glass one they were clearly visible. Under the microscope the flocculent matter was seen to consist of two kinds of confervæ, between which I am quite ignorant whether there exists any connection. Minute cylindrical bodies, conical at each extremity, are involved in vast numbers, in a mass of fine threads. These threads have a diameter of about one fifteen hundredth part of an inch; they possess an internal lining, and are divided at irregular and very wide intervals by transverse septa. Their length is so great, that I could never with certainty ascertain the form of the uninjured extremity; they are all curvilinear, and resemble in mass a handful of hair coiled up and squeezed together. In the midst of these threads, and probably connected by some viscid fluid, the other kind, or the cylindrical transparent bodies, float in great numbers. These have their two extremities terminated by cones, produced into the finest points: their diameter is tolerably constant between .006 and .008 of an inch; but their length varies considerably from .04 to .06, and even sometimes to .08. Near one extremity of the cylindrical part, a green septum, formed of granular matter, and thickest in the middle, may generally be seen. This, I believe, is the bottom of a most delicate, colourless sac, composed of a pulpy substance, which lines the exterior case, but does not extend within the extreme conical points. In some, small but perfect spheres of brown granular matter supplied the place of the septa; and I observed the curious process by which they were produced. The pulpy matter of the internal coating suddenly grouped itself into lines, some of which assumed a form radiating from a common centre; it then continued with an irregular and rapid movement to contract itself, so that, in the course of a second, the whole was united into a perfect little sphere, which occupied the position of the septum at one end of the now quite hollow case. The appearance was as if an elastic membrane—for instance, an Indian rubber ball—had been distended with air, and then burst, in which case the edges would instantly contract and shrink up towards a point. The formation of the granular sphere was hastened by any accidental injury. I may add, that frequently a pair of these bodies were attached to each other, cone beside cone, at that end where the septum occurs. When floating uninjured in the sea, the formation of the spherical gemmules perhaps only takes place, when two of the plants (or rather animals, according to Bory St. Vincent), thus become attached and married to each other. Nevertheless, I certainly witnessed this curious process in several individuals, when separate, and when there was no apparent cause of disturbance. In any case it does not seem probable, from the fixed structure of the septum, that the whole of the granular matter is transferred from one to the other body, as with the true conjugatæ.

"I will here add a few other observations connected with the discolouration of the sea from organic causes. On the coast of Chile, a few leagues North of Concepcion, the *Beagle* one day passed through great bands of muddy water; and again, a degree South of Valparaiso, the same appearance was still more extensive. Although we were nearly 50 miles from the coast, I at first attributed this circumstance to real streams of muddy water brought down by the River Maypo. Mr. Sullivan, however, having drawn up some in a glass, thought he distinguished, by the aid of a lens, moving points. The water was slightly stained as if with red dust; and after leaving it for some time quiet, a cloud collected at the bottom. With a lens, of one-fourth of an inch focal distance, small hyaline points could be seen darting about with great rapidity, and frequently exploding. Examined with a much higher power, their shape was found to be oval, and contracted by a ring round the middle, from which fine curved little setæ proceeded on all sides; and these were the organs of motion. One end of the body was narrower and more pointed than the other. According to the arrangement of Bory St. Vincent, they are animalculæ, belonging to the family of Trichodes: it was, however, very difficult to examine them with care, for almost the instant motion ceased, even while crossing the field of vision, the bodies burst. Sometimes both ends burst at once, sometimes only one, and a quantity of coarse brownish granular matter was ejected, which cohered very slightly. The ring with the setæ sometimes retained its irritability for a little while after the contents of the body had been emptied, and continued a wriggling, uneven motion. The animal, an instant before bursting, expanded to half again its natural size; and the explosion took place about fifteen seconds after the rapid progressive motion had ceased: in a few cases it was preceded for a short interval by a rotatory movement on the longer axis. About two minutes after any number were isolated in a drop of water—they thus perished. The animals move with the narrow apex forwards, by the aid of their vibratory ciliæ, and generally by rapid starts. They are exceedingly minute, and quite invisible to the naked eye, only covering a space equal to the square of a thousandth of an inch. Their numbers were infinite; for the smallest drop of water which I could remove contained very many. In one day we passed through two spaces of water thus stained, one of which alone must have extended over several square miles. What incalculable numbers of these microscopical animals! The colour of the water as seen at a distance, was like that of a river which has flowed through a red clay district; but under the vessel's side it was quite as dark as chocolate. The line, where the red and blue waters joined, was distinctly defined. The weather, for some days previously, had been calm, and the ocean abounded, to an unusual degree, with living creatures. In Ulloa's voyage an account is given of crossing, in nearly the same latitude, some discoloured water, which was mistaken for a shoal: no soundings were obtained, and I have no doubt, from the description, that this little animalculæ was the cause of the alarm.

"In the sea around Tierra del Fuego, and at no great distance from the land, I have seen narrow lines of water of a bright red colour, from the number of crustaceæ, which somewhat resemble in form large prawns: the sealers call them whale-food. Whether whales feed on them I do not know: but terns, cormorants, and immense herds of great unwieldy seals, on some parts of the coast, derive their chief sustenance from these swimming crabs. Seamen invariably attribute the discolouration of the water to spawn; but I found this to be the case only on one occasion. At the distance of several leagues from the Archipelago of Galapagos, the ship sailed through three strips of a dark yellowish or mud-like water; these strips were some miles long, but only a few yards wide, and they were separated from the surrounding surface by a sinuous yet distinct margin. The colour was caused by little gelatinous balls, about the fifth of an inch in diameter, in which numerous spherical ovules were embedded; they were of two distinct kinds, one being of a reddish colour and of a different shape from the other. I cannot form a conjecture as to what two kinds of animals these belonged. Captain Colnett remarks, that this appearance is very common among the Galapagos Islands, and that the direction of the bands indicates that of currents; in the described case, however, the line was caused by the wind. The only other appearance which I have to notice, is a thin oily coat on the surface, which displays iridescent colours. I saw a considerable tract of the ocean thus covered on the coast of Brasil; the seamen attributed it to the putrefying carcase of some whale which was probably floating at no great distance. I do not here mention the minute gelatinous particles which are frequently dispersed throughout the water, for they are not sufficiently abundant to create any change of colour.

"There are two circumstances in the above accounts which appear very remarkable: first, how do the various bodies which form the bands with defined edges keep together? In the case of the prawn-like crabs, their movements were as co-instantaneous as in a regiment of soldiers; but this cannot happen from anything like voluntary action with the ovules, or the confervæ, nor is it probable among the infusoria. Secondly, what causes the length and narrowness of the bands? The appearance so much resembles that which may be seen in every torrent, where the stream uncoils into long streaks the froth collected in the eddies, that I must attribute the effect to a similar action either of the air or sea. Under this supposition, we must believe that the various organized bodies are produced in certain favourable places, and are thence removed by the set of either wind or water. I confess, however, that there is very great difficulty in imagining any one spot to be the birthplace of the millions of millions of animalculæ and confervæ; from whence come the germs at such points?—the parent bodies having been distributed by the winds and waves over the immense ocean. But on no other hypothesis can I understand their linear grouping. I may add, that Scoresby remarks that green water, abounding with pelagic animals, is invariably found in a certain part of the Arctic Sea.

V.—MAGNETIC VARIATION.

(227.) Among the changes which have come over the system of navigation of late years, none have been more important than the different relation which the compass now bears to the ship as compared with its place in former times.

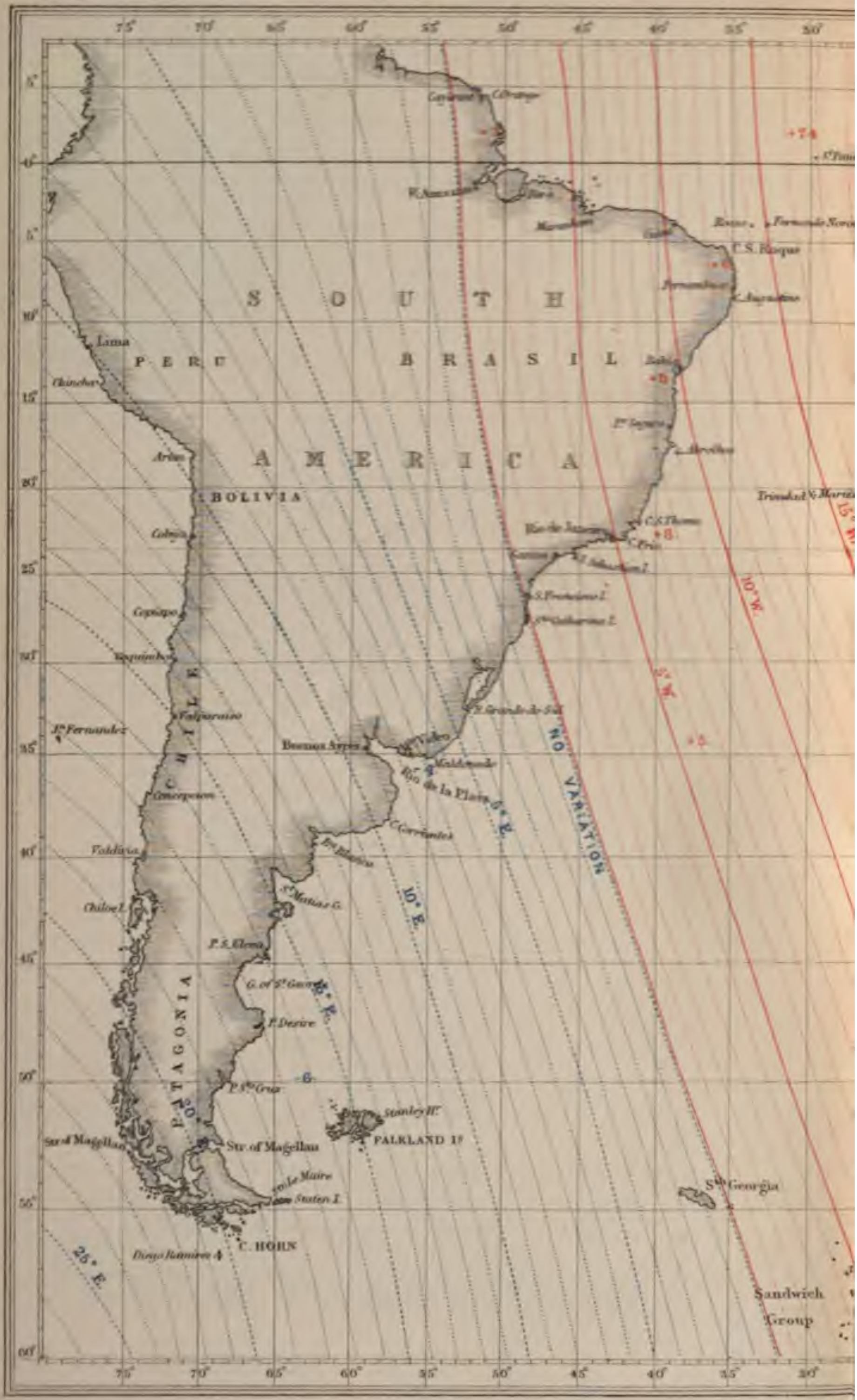
Rude instruments, unadjusted, with errors unsuspected, and under influences destructive to their accuracy, have given place to what may be, in some cases, over estimation of this primary aid to the seaman. In its very nature the compass is imperfect and incompetent to show, at sea, the minute quantities, which are now disputed over. The consequence is, that it is made—like the topic we have before discussed, ocean currents—the scapegoat for many errors of seamanship and judgment, which a more intimate knowledge, and therefore greater mistrust and induced caution, would have avoided.

(228.) Our present task deals with the *geographic* distribution of magnetism, not with those local effects caused by the ship or its relations to outer circumstances, but to its position in the South Atlantic. The other points, most important in themselves, must be discussed elsewhere.

The features of the earth's magnetism, as related to the ship, are the declination, inclination, and intensity. The dip and intensity are very important elements in the adjustment of the compass in its passage through the varied magnetic condition which an over-sea voyage across the Equator, conducts a ship through, but they have but little influence on the directive power of the needle in the latitudes usually traversed in commercial pursuits. The *declination* or variation is one of the most important elements in navigation, and its correct estimation and application most essential to the safe conduct of a ship.

(229.) The reasons why the compass is now placed in so much higher consideration to what it was in former years are manifest. The great increase of the use of iron both for ship building as well as in the fabric of wooden ships, and the consequent vastly-increased influence that the ship has upon her compass, has been one chief reason why attention is so imperatively demanded. Again: since the universal use of steam, the course of a vessel in passing directly from one point to another requires to be much more accurately laid than was thought necessary when wooden sailing ships only were used.

Another reason, which has arisen in the course of years, is that of the secular variation, which causes a tolerably steady augmentation and diminution in the values of the magnetic compasses shown on any and every chart. The appreciation of this change, which has thus become manifest simultaneously with the necessity for improved compasses and improved methods of using them, have placed the magnetic element in charts on a fresh basis. One most important result of this movement was the appointment by the Admiralty of the late Capt. E. J. Johnson as superintendent, in 1842, of the Compass Department. The great improvement in compasses dates from this appointment, and the investigation of the difficult and varying problems of local deviation have been since pursued by eminent men, among whom may be noticed Professor Airy, Dr. Scoresby, W. Walker, Esq., R.N., Archibald Smith, Esq.,



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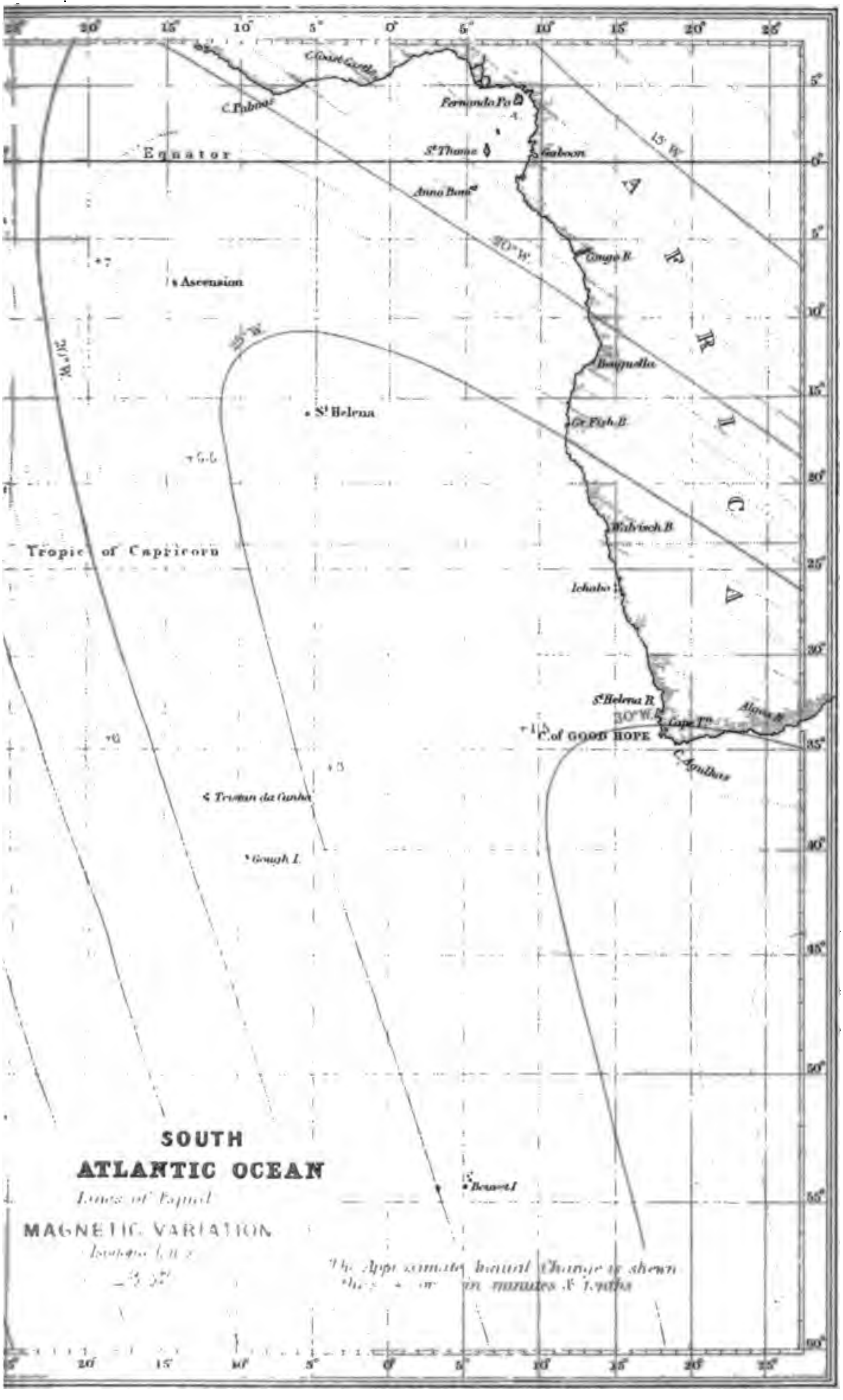

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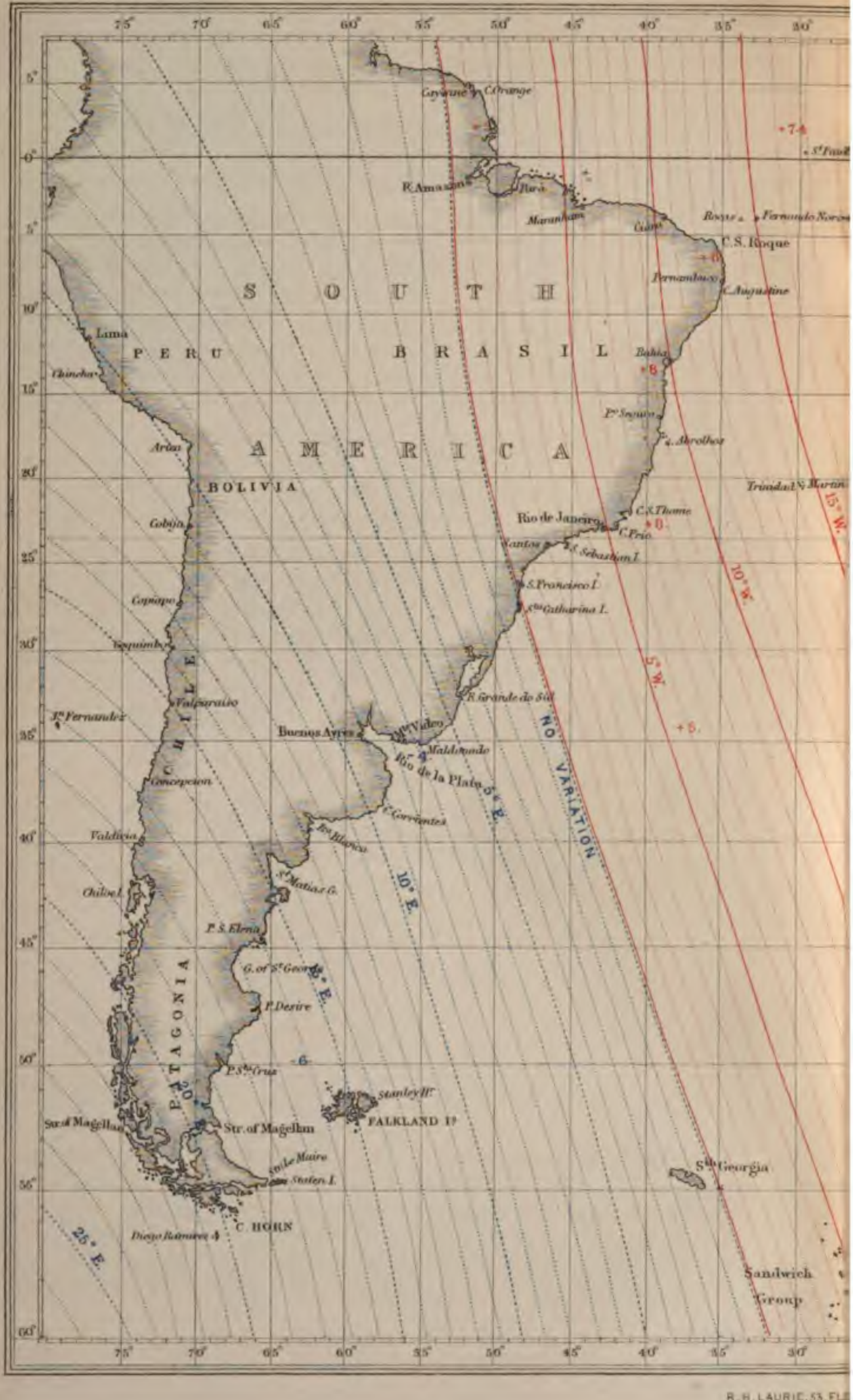

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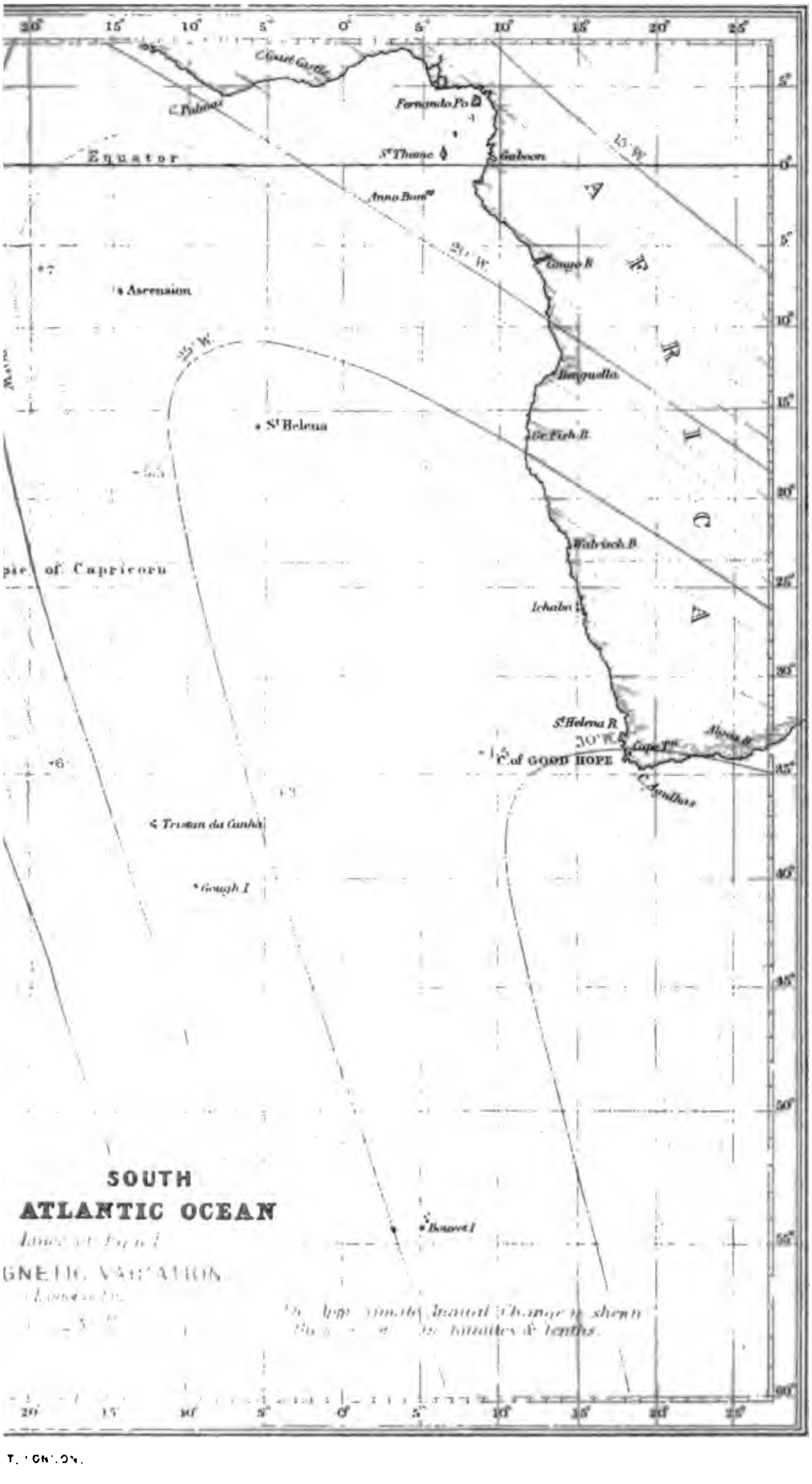


SOUTH
ATLANTIC OCEAN
GNETIC VARIATION
AFRICA
Equator
pic of Capricorn
C. Palmas
C. Coast Castle
Fernando Po
St. Thome
Gaboon
Anno Bom
Congo R.
Ascension
Benguella
St. Helena
Gr. Fish R.
Walvisch B.
Ichabo
St. Helena B.
C. of GOOD HOPE
Cape Tn.
C. Agulhas
Algoa B.
Tristan da Cunha
Gough I.
Bouvet I.
15° W.
20° W.
25° W.
30° W.
20°
15°
10°
5°
0°
5°
10°
15°
20°
25°
5°
0°
5°
10°
15°
20°
25°
30°
35°
40°
45°
50°
55°
60°

T. [illegible]

and many others. These researches have been mainly directed, as before observed, to the effect the ship's iron has on her compasses. Commander F. G. Evans, R.N., who succeeded Capt. Johnson, has drawn up a far more perfect chart of the geographic distribution of the magnetic variation than we have hitherto possessed; former charts having become of impaired value from the lapse of time, and from the imperfection of the observations on which they were based. It is from the chart, brought down to the period of 1882, by applying the secular change requisite to the chart of 1880, that our illustrative chart has been constructed.

(230.) The *isogonic lines*, or those upon which the variation is of the same amount, on this chart, will represent this element, generally as near as the ordinary ships' compass will show it, and will serve to draw attention to any unsuspected change in the magnetism of the ship, besides affording the sailor some information when observation cannot be had.

(231.) The *variation of the compass* in all parts of the coasts of the Atlantic are given with the Tables of Geographical Positions at the commencement of this work, and the amount of annual decrease or increase in this variation is also indicated on the chart. To these notices, therefore, the reader is referred.

It is for the open ocean that the illustrative chart and these notes are intended, and the amount of annual change in different parts is inserted on the chart, so that the approximate variation may be ascertained in future years by applying the necessary correction.

(232.) But it must not be supposed that this annual change is regular and of the same amount in each year. By the accurate observations that are now self-recorded, the connection between these changes and apparently very remote causes have been identified. One of these, at the first glance a very singular one, is that the spots in the sun, if absent or present in large quantities, have a marked magnetic influence on the declination, thus demonstrating the source from which the magnetism of the earth is chiefly derived. As the Greenwich observations will illustrate our subject as well as any—and this volume might be filled with interesting results on this subject—the notices will be limited to the extracts from those observations as being sufficient to impart a notion of the ever-varying amount of the magnetic variation.

TABLE, *showing the Mean Monthly Westerly Magnetic Variation at Greenwich.*

Month.	1844.	1848.	1850.	1855.	1860.	1862.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
January	23 19 22	22 50 2	22 28 5	21 49 50	21 14 38	20 58 37
February	23 18 43	22 49 5	22 27 28	21 48 13	21 13 2	20 58 21
March	23 18 42	22 53 46	22 26 54	21 48 41	21 14 53	20 57 32
April	23 18 42	22 52 27	22 25 44	21 48 44	21 15 4	20 50 43
May..............	23 19 23	22 52 46	22 25 1	21 48 25	21 17 10	20 49 5
June	23 19 8	22 53 21	22 24 47	21 40 12	21 16 1	20 52 31
July.............	23 18 40	22 53 18	22 23 41	21 48 14	21 15 44	20 49 39
August	23 13 25	22 52 36	22 22 4	21 48 31	21 15 27	20 51 46
September	23 13 6	22 51 31	22 25 43	21 47 9	21 12 44	20 50 33
October	22 12 52	22 52 11	22 19 1	21 46 21	21 13 28	20 50 6
November	22 11 50	22 51 46	22 18 27	21 45 59	21 12 49	20 50 9
December	22 49 41	22 51 40	22 18 27	21 45 54	21 11 30	20 49 35

Month.	1865.	1867.	1870.	1875.	1877.	1879.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
January	......	20 22 0	19 57 28	19 24 6	19 1 0	18 44 0
February	20 31 6	20 21 20	19 56 44	19 23 36	19 0 48	18 43 12
March	20 32 25	20 23 26	19 56 21	19 23 42	19 1 12	18 42 36
April	20 33 58	20 23 8	19 55 6	19 22 48	18 59 36	18 41 24
May..............	20 33 51	20 21 57	19 54 50	19 21 36	18 57 36	18 40 18
June	20 30 36	20 20 27	19 52 52	19 21 6	18 57 24	18 40 36
July..............	20 31 27	20 19 54	19 52 57	19 20 36	18 55 54	18 41 6
August	20 33 1	20 19 36	19 52 16	19 20 48	18 55 30	18 39 42
September	20 33 1	20 18 57	19 51 55	19 20 24	18 55 24	18 38 48
October	20 34 11	20 18 50	19 51 40	19 19 30	18 54 36	18 39 48
November	20 32 56	20 17 50	19 51 18	19 18 48	18 53 24	18 38 48
December	20 33 18	20 16 3	19 50 26	19 17 24	18 53 42	18 36 18
Means............	20 32 43	20 20 17	19 53 39	19 21 12	18 57 12	18 40 30
MEAN DIP	68 2 40	67 57 14	67 52 38	67 42 18	67 39 38	67 36 55

(233.) Upon examining these columns of figures, it will be at once seen that the decreasing amount of westerly variation is very far from being regular, and that at some times the variation is absolutely *increasing*. Thus, the variation in June, 1847, was 22° 43′ 0″; in June, 1848, 22° 53′ 21″, an *increase* of 10′ 21″. The *decrease* between January, 1846, and January, 1847, was only 1′ 38″; to January, 1848, 1′ 4″; to January, 1849, it decreased 14′ 6″; and to January, 1850, 5′ 51″; the mean annual rate for these four years being 5′ 44″. The variation in 1879 was about 18° 40′, so that it had decreased 4° 42′ 56″ in the thirty-five years that had elapsed since 1844, or at the rate of 8′ 0″ per annum; but its mean rate at Greenwich is about 8½′ at present.

The needle also varies very considerably at times in the course of the day, the maximum westerly declination is at 2 p.m. This diurnal change amounts to 7′, 8′, 9′, and 10′. This topic is so large and comprehensive, that it must be left to other works. The foregoing and the illustrative chart will suffice for the present purpose.

VI.—PASSAGES.

The navigation of the South Atlantic Ocean presents but few difficulties. Its wind and current systems are simple and easily understood, as will be seen by the preceding pages, and it is comparatively free from those storms and hurricanes which render some portions of the North Atlantic much to be dreaded at some periods of the year. It is therefore easily traversed in any direction, and it requires but few directions.

All the difficulties and troubles are over when the Equator is reached, as frequently noticed before. The belt of calms, monsoons, and baffling winds or doldrums, which separates the N.E. from the S.E. trade winds, lies to the North of the Equator, and is amply dilated on in pp. 36 (11), 48, &c., as well as more fully in the "North Atlantic Memoir," 1879, pages 217—231, where the probable limits, character, and seasons of these chief obstacles to a rapid voyage are described.

The S.E. trade wind, its force, direction, and character are described on pages 41—53; and the anti-trades, or westerly winds to the South of them, on pages 87—97. The currents, which probably will be encountered, are described in Section III, pages 102—127, and the peculiarities of the winds, seasons, and currents on the Brasilian and African coasts, are described in their respective places. To these the reader is referred; what follows will be a few remarks on the tracks across the North Atlantic from the "North Atlantic Memoir," as a prelude to the succeeding portions of the voyages across the South Atlantic, the more particular province of this work.

1. FROM EUROPE, ETC., TO THE EQUATOR.

It is probable that there has been more discussion upon the route from the British Islands to the Equator, and on the best meridian for crossing the line, than upon any other passage. And yet the results of these inquiries as to this, the great highway of the ocean, have served to confirm in a great degree the opinions published in the early days of navigation, before any of the modern improvements and appliances had been brought to bear upon it.

The directions which were given by M. D'Aprés de Mannevillette, in his great "Neptune Orientale," published more than a century since, might be followed now without losing much, if any, of the advantages which deep study and extensive inquiry into data lately acquired, would give to the shipmaster.

Captain Maury, at the time of the publication of his "Wind and Current Chart," in 1849, first advocated a more *westerly* crossing of the Equator than had been before pursued. This arose from looking at the voyage from the opposite side of the Atlantic to that on which almost all previous sailing directions had been composed. The configuration of the land about the equatorial portion of the Atlantic is peculiar, and causes the difficulties of a trans-equatorial voyage. The eastern point of the continent of South America, the "great bugbear" Cape San Roque, as Maury calls it, and the land about Pernambuco, lying in the strength of the S.E. trade, and the consequent strong current to leeward which runs past it, were constantly the dread of the older mariners, whose ships made so much leeway, and were incapable of sailing on a wind as our modern clippers do. But from the improvements in ships and their rig and management, much that was formerly insuperable is now quite practicable, and many of the difficulties of clearing Cape San Roque have vanished upon later inquiry.

The other difficulty, which also combines with Capt. Maury's argument, is the intervening belt of calms and monsoons (which extends nearly across the ocean between the trade winds), which have a triangular form, the base lying upon the African coast, between Cape Verde and the Equator, and gradually getting narrower to the westward, and therefore, by crossing them well to the westward, they are traversed in a shorter distance, and their detaining effects are much less experienced. See page 60, &c.

The great object, then, of all vessels from any port of the North Atlantic, whether on the European or the American side, being to clear Cape San Roque, it follows that often the routes are the same from all quarters, and that the Equator is perhaps most advantageously crossed by all at the same point, This, generally, is the American argument, but, as will be seen presently, it is not universally accepted yet. It is probable that as much advantage is gained by making the northern edge of the N.E. trades at a proper point, as by leaving their southern limit; but this will be discussed hereafter. All these discussions, of course, refer to *sailing vessels*, those entirely dependent on the peculiar meteorological condition of the localities they have to traverse.

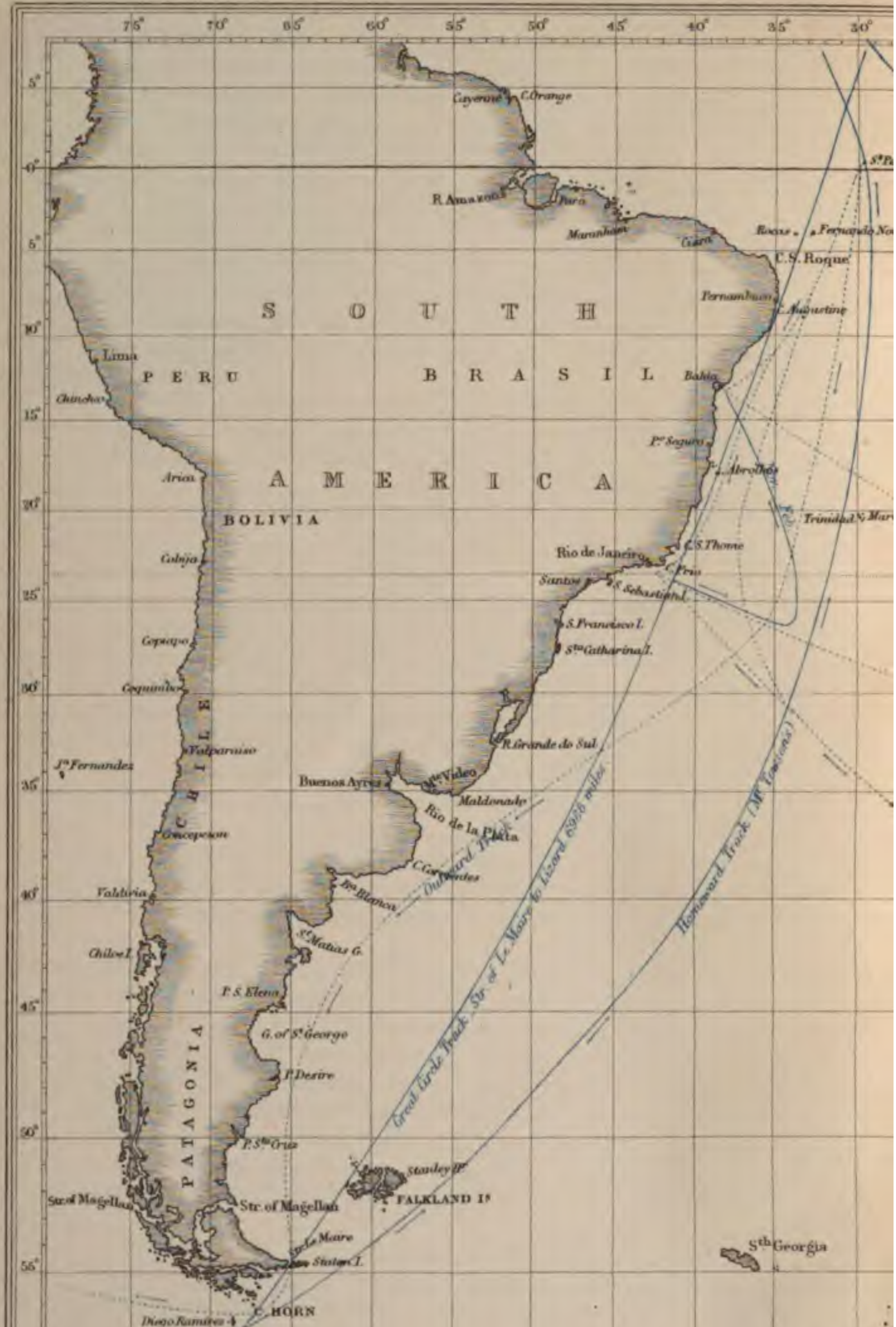
Steam-ships, of course, are in a different category, and the *shortest* distance is therefore their best route, provided it does not lead them through any adverse influences.

Now the Great Circle route from the Lizard to Cape Horn is probably nearly the best that could be followed, even if it were not the mathematical course. It passes near to the West end of Madeira and the Cape Verde Islands, as is directed for sailing ships, and thence crosses the Equator in long. 31¾° W. It almost touches Pernambuco, and passes close to Rio de Janeiro, towards the Strait of Le Maire, the total distance being 6,988½ miles.

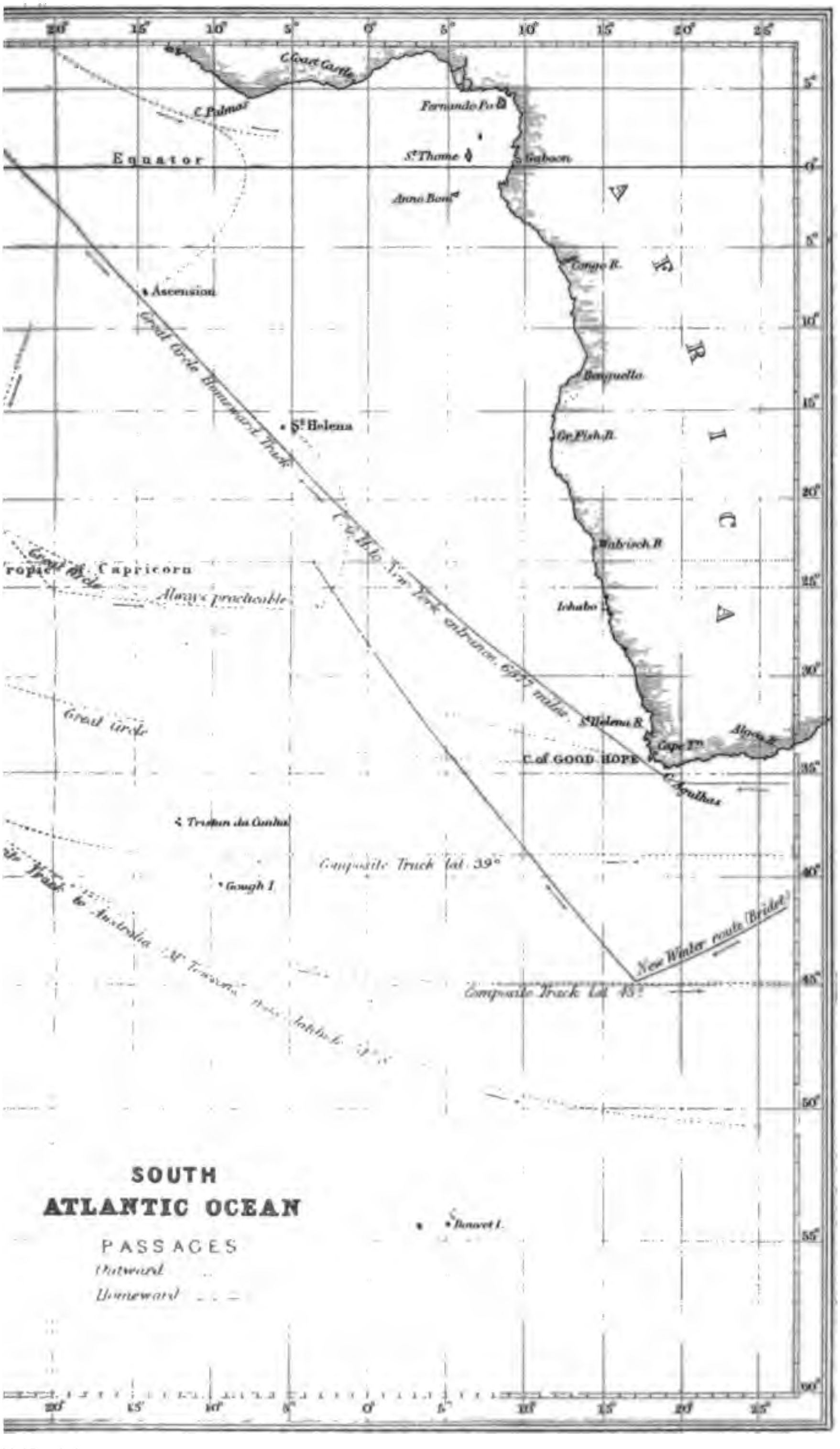
Again, the Great Circle route from New York to the Cape of Good Hope is a good route for steam-ships out or home. It cuts the Equator in 22° W., passing through Ascension and just westward of St. Helena, the distance being 6,877 miles.

To steam-vessels there will be no difficulty in following either of these nearest routes, and they will be only modified in sailing-vessels by the force of the trade winds, which will make the course through the trades more southerly than the Great Circle in going southwards.

Although a voyage round either of the great capes—the Cape of Good Hope or Cape Horn—involves a more extended problem than that of the


75° 70° 65° 60° 55° 50° 45° 40° 35° 30°
5° 0° 5° 10° 15° 20° 25° 30° 35° 40° 45° 50° 55° 60°
Cayenne
C. Orange
R. Amazon
Para
Maranham
Ciara
Rocas
Fernando No
C. S. Roque
Pernambuco
C. S. Augustine
SOUTH
BRASIL
AMERICA
Lima
PERU
Chincha
Bahia
Pt Seguro
Abrolhos
Trinidad & Mar
Arica
BOLIVIA
Cobija
Rio de Janeiro
C. S. Thome
C. Frio
Santos
S. Sebastian I.
S. Francisco I.
Sta Catharina I.
Copiapo
Coquimbo
CHILE
Valparaiso
Jn Fernandez
R. Grande do Sul
Buenos Ayres
Mt Video
Maldonado
Rio de la Plata
Concepcion
C. Corrientes
Outward Track
Great Circle Track Str of Le Maire to Lizard 6956 miles
Homeward Track (Mr Towson's)
Valdivia
Bn Blanca
St Matias G.
Chiloe I.
P. S. Elena
G. of St George
P. Desire
PATAGONIA
P. Sta Cruz
Stanley Hr
FALKLAND Is
Strt of Magellan
Str. of Magellan
Str. le Maire
Staten I.
Sth Georgia
C. HORN
Diego Ramirez Is
Sandwich Group

R. H. LAURIE, 53,


SOUTH
ATLANTIC OCEAN
PASSAGES
Outward
Homeward
Coast Castle
C. Palmas
Fernando Po
S^t Thome
Gaboon
Anno Bon
Equator
AFRICA
Congo R.
Ascension
Benguella
S^t Helena
Gr. Fish R.
Great Circle Homeward Track
C. G. H. to New York entrance 6917 miles
Walvisch B.
Ichabo
Tropic of Capricorn
Great Circle
Always practicable
Great circle
S^t Helena B.
Cape T^n
Algoa B.
C. of GOOD HOPE
C. Agulhas
Tristan da Cunha
Composite Track lat. 39°
Gough I.
Track to Australia
New Winter route (Bridet)
Composite Track Lat. 45°
Bouvet I.
20°
15°
10°
5°
0°
5°
10°
15°
20°
25°
5°
0°
5°
10°
15°
20°
25°
30°
35°
40°
45°
50°
55°
60°

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passage over the South Atlantic, with which this book especially deals, yet all the difficulties and phenomena which regulate the whole voyage are encountered North of the Equator, and therefore the discussion of the voyage to the Equator includes the whole problem, and what would follow, for the South Atlantic, is simple and easily followed.

The GENERAL INSTRUCTIONS for making the passage from the English or the St. George's Channels to the Equator, may be briefly summed up as follows :—

1. From the Lizard or the Tuskar, steer W.S.W. to gain an offing, to longitude 10° or 12° W.
2. From thence steer so as to pass to the westward of Madeira.
3. Thence to the West of the Cape Verdes, and across the Equator.

Each of these portions of the voyage are described separately in the work from which they are taken.

From North American ports the tracks fall into those from Europe at the Equator, so that all sailing directions southward are common to all. Captain Maury says, "I would recommend vessels, in coming out of New York and Boston to stand off well to the eastward when the winds are fair, before attempting to make any southing. The degrees are short, and by standing as far as 60° or 50° before crossing the parallel of 40°, you have a better chance for running South across the horse latitudes. This recommendation applies to all months, but only when the winds are fair for easting."

It was about the year 1848 that Maury suggested that a great circle course from any of the northern ports of the United States to the crossing of the Equator would be an advantageous track, and the subsequent experience fully bore out his argument, and the dread of being drifted to leeward of the eastern projection of Brasil gradually became lessened. In ten years the superiority became established, although a few vessels, as Maury said, still stick to the old route. A large number attempted to "split the difference," and to pursue a middle course between the old route and the new. Upon a discussion on the subject in the later period, 1858, the matter is summed up thus :—

From 30° N. to the line, the average distance sailed daily during the winter months is 92 miles by the old route against 134 by the new. To what is this difference owing? Are the ships that take the new route the faster? That can hardly be. They are better navigated I have no doubt, for, as a rule, the log books show that. But still that is not sufficient to account for all this difference. In winter a ship that takes the new route from 30° to the line will go nearly as far, on the average, in one day as she could go in a day and a half by the old route. This is owing, in a great measure, to the fact that the new route lies through a region of the ocean where the breezes are brisk, and brisk breezes always help to make both officers and crew brisk. This great difference of time and speed is probably owing to this circumstance more than to any other. The further from the coast of Africa. both in the North and South Atlantic, the fresher blow the trade winds.

2. CROSSING THE EQUATOR.

This topic also is discussed in the North Atlantic Memoir, pages 465—484, and a few remarks are extracted from that work. It may be stated that Captain Maury advocates an extreme western meridian of 28° 31′ W. as the best to be in lat. 0° through the year. Undoubtedly much advantage has been gained over the older, and also invariable, practice of crossing on to the South Atlantic 10° further eastward; but it is still open to question whether a modification of this rigid system is not advisable. The wind and current systems change with the change of seasons; why should not the track of vessels crossing them also vary with these changes? Captain Maury argues that the average gain has been from 3·5 to 13·7 days in the North Atlantic voyage, or a mean monthly gain of 8·7 days out of from 36 to 44·9 days, the old average; the *best* averages being only 23 days.

But Captain H. Toynbee, of the *Gloriana*, has in some degree controverted the opinions above given, at least for the month of October, and after detailing his experience he says:—

"The conclusion I am inclined to draw from all this is, that in October, when once your ship is so near the Equator as to expect the S.E. trade, and the wind sets in from S. by W. by compass, go on the port tack with the yards sharp up, and keep well full; then the wind is almost certain to turn into the S.E. trade with beautiful weather. My experience would lead me to say that in October, when you are below 5° N., with a steady S. by W. by compass wind, you have the commencement of the S.E. trade, and should stand boldly on the port tack: but I am not quite decided as to how a ship ought to steer after passing to the westward of the Cape de Verde, though I think as we have done this year; that is, due South with a fair wind, and the tack on which you make the most southing with a foul; because the probability is, that you will have a S.W. monsoon, which will drive you well to the eastward. If there were not this probability, I would have a ship in October steer to get the S.E. trade, or rather the S. by W. wind, in about 20° W., for if she does not get into the latitude of Cape St. Roque quite so soon, I think we shall be in a better position by the time she loses the S.E. trade."

On pages 119—121 are given some remarks on the South Equatorial Currents, issued by the Hydrographic Office, as derived from the observations deposited at the Meteorological Department of the Board of Trade, between 1855 and 1865. The following refers to the question of the crossing of the Equator from the same document:—

As the best meridian for crossing the Equator by outward-bound ships, still appears to be an unsettled question among navigators, and as it is connected with the subject of the Equatorial Currents referred to above, it may be of interest to seamen to append the following tabular statement, showing where each of the 930 ships already alluded to made their crossings;—it being observed that all these ships were bound from British ports either to or round the Cape of Good Hope, round Cape Horn, or to some port of South America, southward of Bahia, between 1855 and 1865 :—

Meridians of Crossing the Equator.

		E. of 20° W.	20° to 22° W.	22° to 24° W.	24° to 26° W.	26° to 28° W.	28° to 30° W.	30° W. & Westward.
January	No. of Ships	3	5	9	21	15	22	10
February	„	5	6	7	12	13	4	2
March	„	7	8	11	21	17	8	2
April	„	7	12	25	12	11	2	2
May	„	1	8	12	19	16	15	4
June	„	—	2	2	11	24	22	10
July	„	3	12	8	18	22	9	25
August	„	17	10	11	15	19	5	11
September	„	15	10	7	12	20	8	7
October	„	2	9	6	11	22	17	16
November	„	—	3	1	10	17	32	29
December	„	2	1	3	9	21	12	10
	930 Ships	62	86	108	171	218	156	129

It is impossible, without a more rigid analysis than has yet been bestowed on this question of crossing the Equator, to determine with precision the best meridian. It is certain that it must vary according to the seasons, and perhaps the months; and as will be seen by a few examples appended, the evidences of the advantages of the more easterly route contrast favourably with the extreme westerly route.

Until, however, the various conditions attending the size, class, and speed of the ships, the favouring circumstances or otherwise of veins of wind, or calms, and other local conditions are duly allowed for, and include a large number of ships extending over several years, it appears reasonable to assign weight to the practical results afforded in the foregoing tabular statement.

One fact is observable in compiling this statement, viz., that of the 930 ships, 808 passed 100 miles or more to the eastward of the Rocas, and thus to the eastward of Fernando Noronha.

Examples of the number of days occupied by *sailing* ships in reaching the Equator in different meridians and at different months of the year from among the 930 ships quoted:—

In January and February, three ships of 609, 614, and 1,126 tons respectively, cross the Equator in 21°, 24¾°, and 32½° W., and are respectively 21 days from Greenock, 22 days from the Start, and 23 days from Liverpool.

In March, April, and June, four ships of 964, 898, 1,041 (deeply laden), and 477 tons respectively, cross the Equator in 21½°, 23¾°, 24½° and 28°, and are respectively 21½, 26, 31, and 34 days from Deal, Plymouth, Gravesend, and Liverpool.

In July and September, three ships of 1,160, 1,202, and 765 tons respectively, cross the Equator in 30¾°, 32¼°, and 32½° W., and are 20½, 38, and 42 days respectively from Scilly, the Downs, and Liverpool.

In November, 1855 and 1856, two ships of 1,050 and 300 tons respectively cross the Equator in 31¼° and 31° W., and are 45 and 21¼ days in crossing the Equator from Liverpool; the ship making the longest passage leaving

Liverpool with a "fair but light wind, which lasted with slight intermission to the N.E. trades, which are also light. Ship was 14 days from 6° N. to the Equator."

The foregoing remarks and conclusions are based on the knowledge obtained from the older wind and current charts, chiefly those published by the United States Government, under the direction of Captain Maury. But since that period the Meteorological Department of the Board of Trade has published the conclusions arrived at from the arrangement and discussion of the vast accumulation of observations made between lat. 20° N. and 10° S., and long. 10° and 40° W., in the Atlantic Ocean, which had been accumulating for 18 years prior to 1873, as commenced by Admiral FitzRoy.[*] These most important and elaborate works, to those with leisure to properly study them, will be found both interesting and valuable.

A warning is here given that the *direction* of the wind or current is only shown from that point at which it was most frequently observed, and the *force* of the wind or current from that direction alone indicated. Captain Toynbee's remarks supply further detail, and will, we believe, make what is here given from these valuable works quite sufficient for the sailors requirement.

But here we confine the extracts to those relating to the Winds and Currents, and the deductions as to the best meridians for crossing square 3 outward and homeward, only omitting generally those relating to the temperatures of the air and sea, as these subjects would unduly swell the bulk of this work.

In a previous section a general outline of the Meteorology of the Atmosphere and Ocean is given, and in (11), page 36, it is shown that the Meteorological Equator, dividing the phenomena of the Northern Hemisphere from those of the South, is *always* to the North of the Mathematical Equator, in the Atlantic Ocean. Therefore all difficulties or complication in passing from one hemisphere to the other are always encountered to the North of the line.

Again, the geographical separation of the two portions of the Atlantic seems to be distinctly between Sierra Leone and Cape San Roque in Brasil, so that still farther is it necessary to include a portion of the ocean lying in North latitude.

As the Equatorial Doldrums are of the greatest importance to navigators, especially in sailing ships, it has been decided to commence with them.

Here it may be well to say that the doldrums are the calms and unsettled weather which exist between the trade winds; they travel North and South after the sun, and pass twice in the course of a year, through the square with which we are about to deal. If any of my readers are afraid of forgetting their name, they have only to pass *once* through them to have it impressed on their memories for ever. It may be necessary to premise that the numbering of the 10° squares, the suggestion of Mr. Marsden to Admiral FitzRoy, has been found to be very convenient. The whole world was thus enumerated, No. 1 square being that between the meridian of Greenwich and 10° W.; No. 2 thence to 20° W.; No. 3 thence to 30° W., &c., and limited on the South by the Equator. Thus No. 3 square lies midway between the two continents, and includes the Meteorological Equator.

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[*] (1) Charts of Meteorological data for square 3. Lat. 0°—10° N., long. 20°-30° W., and Remarks to accompany the Monthly Charts, which show the best routes across the Equator for each month, &c. 1874.

(2) Charts of Meteorological data for the Nine 10° Squares of the Atlantic, which lie between 20° N. and 10° S., and extend from 10° to 40° W., with accompanying Remarks, ending with the Best Routes across the Equator. 1876.

The 10° square (No. 3 of Mr. Marsden's numbered squares) extending from the Equator to 10° N., and from 20° to 30° W., has been selected as the one of most importance, and in which the largest number of observations have been collected.

In that *zone* of the Atlantic which lies between the parallels of 20° N. and 10° S., we have extracted nearly 125,000 observations; and, although they extend over the twenty-six numbered squares, we find that nearly 60 per cent. of the whole were taken in No. 3 SQUARE, which, for distinction, is slightly *shaded*.

In several of the squares the number of observations is so small that it would be useless to give them on monthly charts for each 2° square, as was done for square 3, they have therefore been sifted into spaces of 2° of latitude by 5° of longitude. This method has the advantage of enabling us to represent a larger space on the same chart; and in most instances the spaces seem to be small enough to point out any differences which actually exist.

Captain Toynbee remarks:—"Having thus given a general view of the work we have in hand, I will now refer to the monthly diagrams, and also call attention to some interesting facts which have struck me in writing the remarks. Perhaps I ought first to say that in several instances the number of observations is so small that the isobars, isotherms, and wind and current arrows are not always so correct as a larger amount of data would make them; still in square 3 (which is the centre of the district) and in squares 39, 301, and 302, there is a large number of observations, so that the general result is satisfactory: for we find that the same month in different years has very much the same kind of wind and weather. I may add that though all data have been referred to the centre of the space to which they belong, it sometimes happens that nearly all the observations have been taken on one side of that space.

In the first place, then, it will be seen that we are dealing with a part of the sea where the two trades are always meeting, though the latitude in which they meet varies with the season. This work therefore gives the meteorologist a constant opportunity for studying the motion of air where two air currents meet, and also the weather resulting therefrom.

Besides the meeting of two currents of air there are also two currents of water, which are mainly produced by the trade winds, and apparently increased in speed by the drift of water forced against Africa by the winter gales of each hemisphere; the direction of the trades tends to draw water away from the coast of Africa, and as the land prevents an influx of water from the westward, there is a third current or back drift to the eastward into the Gulf of Guinea to replace the water drawn away by the trade winds. This is the well-known Guinea Current, which seems to be chiefly the result of gravity.

Captain Toynbee in his introductory remarks says:—"The part of the sea with which we are about to deal is of the greatest importance to the navigator, as it contains the much dreaded Doldrums, through which every ship bound to the southward of the Equator must pass; and it is no uncommon thing for ships to lose a fortnight or even three weeks, through taking a wrong route for the month."

It must be remembered that winds are named after the direction *from* which they come, while currents are named after the direction *towards* which they go; for instance, an arrow pointing to the north-westward represents a S.E. wind, but a N.W. current; therefore in the diagrams the *tails* of the wind arrows and the *heads* of the current arrows point towards the points of the compass after which they are named.

The remarks are elucidated by the adjacent diagrams, which explain themselves, it being merely necessary to state here that the different winds and currents are shown by different coloured shading, their *mean* force being relative to the intensity of the colour: the winds from 1 to 5, Beaufort's scale (see page 37, ante), and the currents from 0 to 50 miles per day, as explained in the notes.

BEST MONTHLY ROUTES ACROSS THE EQUATOR, BY CAPTAIN TOYNBEE, F.R.G.S., F.R.A.S., ETC.

Although the following suggestions are considered to be the *safest*, when giving advice for all classes of ships, they are not intended to override a captain's own judgment, for he has the advantage of knowing the qualities of his own ship.

Special attention is necessary in critical parts of the sea, such as that near Cape St. Roque, where at one season of the year outward bound ships are liable to be caught by southerly winds and leeward currents, and at another season of the year homeward bounders by light north-easterly and northerly winds.

The navigator must remember that it is impossible to lay down fixed tracks for him to follow, because the winds are not always the same at the same time of year. The tracks given on the chart are those which it is probable the wind will permit him to follow. Sometimes he will be able to do better than to strictly follow these tracks; at others he may be driven to do worse. He should not go out of his way to follow them, neither should he be guided by them alone, but by reading the remarks, form an independent opinion.

To the Outward bounder the tracks indicate the best routes for wind, and a safe longitude for crossing the Equator into the region of the S.E. trades, keeping clear of the coast of South America. To the Homeward bounder they indicate the best routes for wind across the Equator and up to the southern limit of the N.E. trades.

January.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, for although the wind is equally strong close to their eastern side in January, it is decidedly stronger on the western than on the eastern side of square 3.

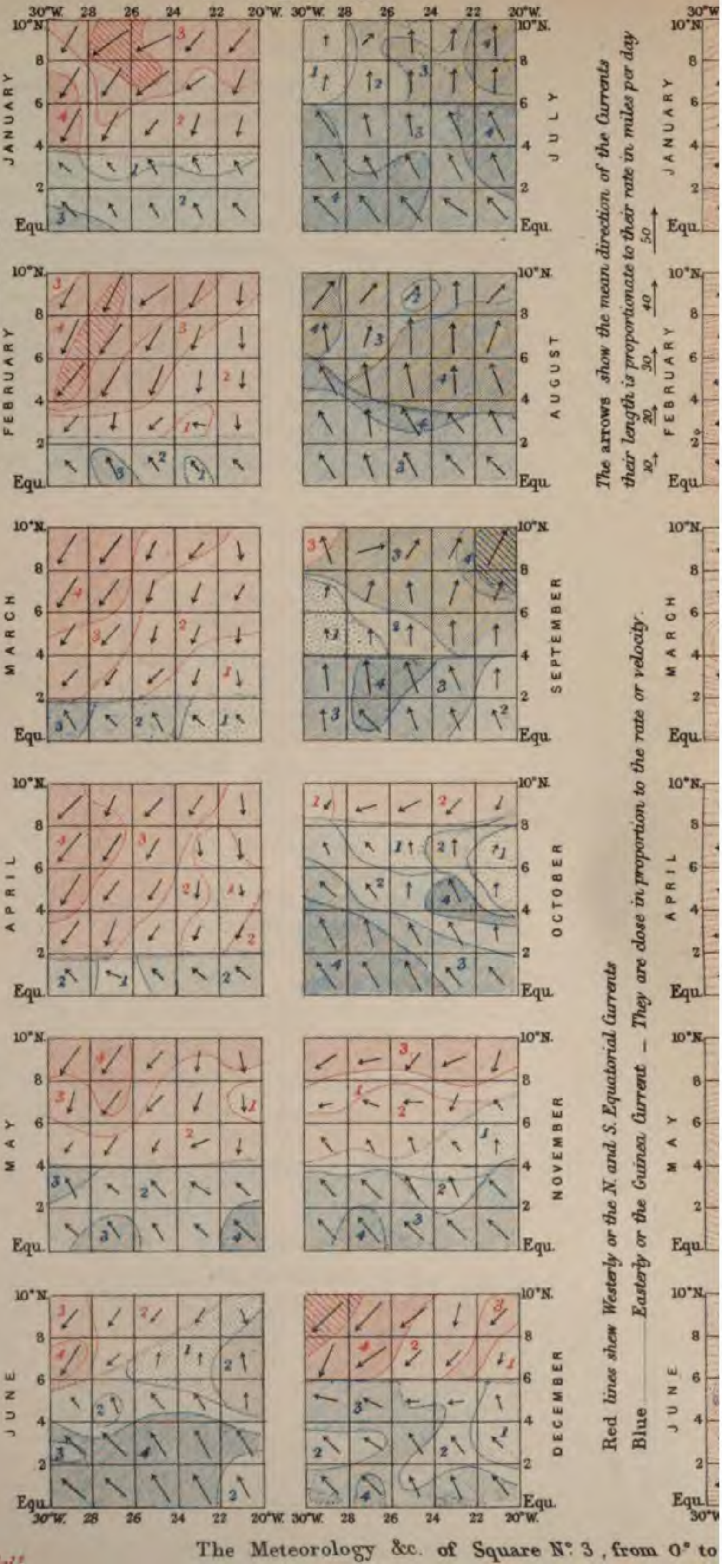
Red *shading shews the North East Trades*
Blue *South East Trades*
Dark *Sth. and S.W. Monsoon.*

The shading is dark in proportion to the strength.

5	4	3	2	1
▨	🟥	🟥	🟥	☐
▨	🟦	🟦	🟦	☐
▨	⬛	⬛	⬛	☐

The arrows shew the mean direction of the Wind
Their length is proportionate to the strength in Beaufort's Scale.
1 → 2 → 3 → 4 → 5 →

W I N D S



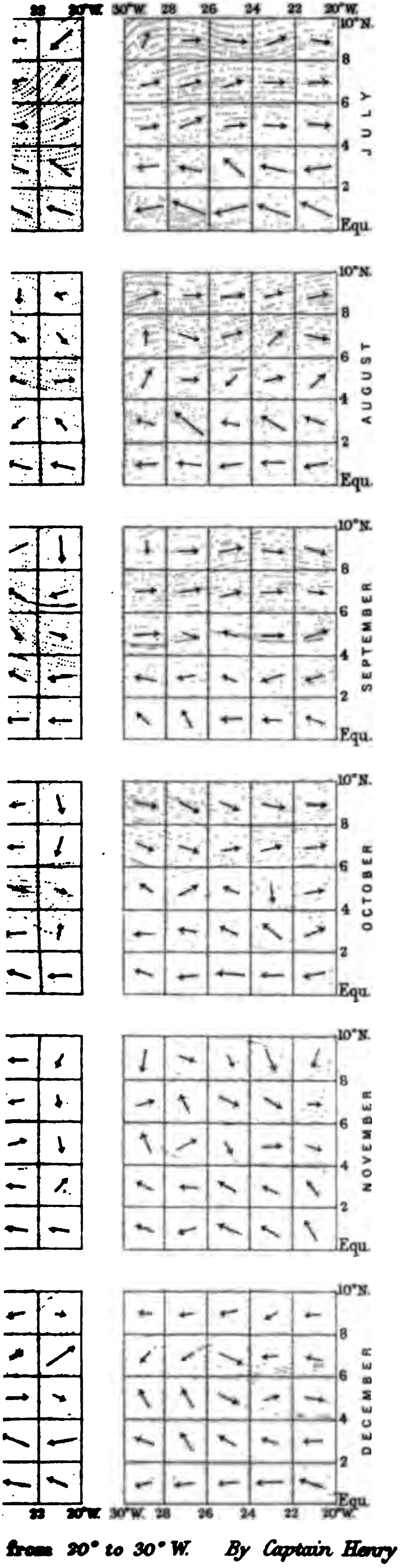
The arrows show the mean direction of the Currents
their length is proportionate to their rate in miles per day
10 → 20 → 30 → 40 → 50 →

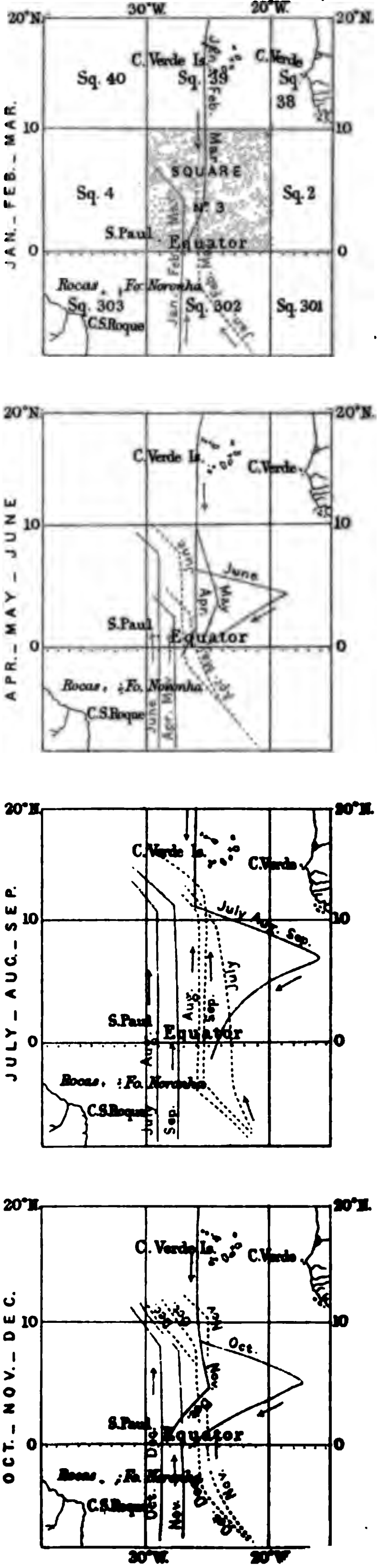
Red *lines shew Westerly or the N. and S. Equatorial Currents*
Blue *Easterly or the Guinea Current — They are close in proportion to the rate or velocity.*

The Meteorology &c. of Square N°. 3, from 0° to

S.A. p. 174
N.A. p. 466

URRENTS ROUTES





Outward Tracks are *coloured* blue _ Homeward Tracks *coloured* red { *from the Westward thus* ——
 " " *Eastward* ....

from 20° to 30° W. *By Captain Henry Toynbee* F. R. G. S.

Although the north-easterly wind prevails to the Equator West of the meridian of 30° W., and fast weatherly ships have done well after crossing the Equator to the westward of that meridian, others have been hampered by the land, which is shown by the January wind remarks. A dull sailing ship which crossed the Equator in 32° 45′ W. on December 13th, was 35 days before she cleared the land. The safest westerly limit for such a dull sailer is 26° to 27° W.

Referring to the eastern half of the January Wind Chart for square 303, and taking S.E. by E. as a central point; then when the wind is not from that point:—

Between	0° & 2° S.	the prob. is	about equal that it will either be more Sly. or more Ely. or N.-Ely.*		
„	2° & 4° S.	„	2 to 1	that it will be	more Sly.
„	4° & 6° S.	„	4 to 3	„	„
„	6° & 8° S.	„	4 to 3	„	Ely. or N.-Ely.
„	8° & 10° S.	„	4 to 1	„	„

The January Chart for square 303 shows a prevailing westerly current of from 20 to 30 miles in 24 hours, and that it is stronger in the northern than in the southern half of the square. Exceptional currents, stronger than the means shown on the chart, are sometimes recorded. The chart for square 303 shows a large per centage of smooth sea in January. The above-named facts, taken together with the qualities of his ship, will enable the navigator to decide on his best route.

Ships bound to the northward should cross the Equator between 25° and 30° W. so as to avoid the light north-easterly winds which sometimes blow near the South American coast in this month, and also to pick up the fresh N.E. trade, which prevails in that longitude between 4° and 6° N., but not further to the eastward.

February.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, as the western sides of squares 39 and 3 have stronger winds than their eastern sides. They should stand to the southward in about 26° W. and when they meet the southerly wind, take the tack which gives the most southing, endeavouring not to cross the Equator to the westward of 28° W.

Referring to the eastern half of the February Wind Chart for square 303, and taking S.E. by E. as a central point; then when the wind is not from that point:—

Between	0° and 6° S.	the probability is	about equal that it will be more Sly. Ely. or N.Ely.
„	6° and 8°	„	slightly in favour of its being more Ely. or N.Ely.
„	8° and 10°	„	about 2 to 1 that it will be more Ely. or N.Ely.

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* In working out these probabilities all observations of wind from N. have been considered as north-easterly, and all from South have been considered as southerly. The few observations from the western half of the compass have not been included.

The prevailing current is still westerly, averaging from 20 to 30 miles a day, and generally stronger in the northern than in the southern half of the square. The chart shows that confused seas are not uncommon. The Remarks on Wind, for square 303, show that ships which crossed the Equator to the westward of 30° W. were not much hampered, but there seems to be no inducement to cross to the westward of 28° W.

Ships bound to the northward should carefully avoid the eastern side of square 3, where the north-easterly wind is light, and there is much light north-westerly wind, so should cross the Equator to the westward of 25° and to the eastward of 30° W., by which means they will not get too near the coast of South America, where light north-easterly winds are not uncommon.

March.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, the N.E. trade being stronger on the western than on the eastern sides of squares 39 and 3. The March diagram shows that between 35° and 40° W., north-easterly winds prevail to the coast of South America, and to 2° S. between 30° and 35° W.

Referring to the eastern half of the March Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between	0° & 2° S.	the prob. is about	3 to 1	that it will be more	Ely. or N.Ely.
,,	2° & 4° S.	,,	3 to 2	,,	,,
,,	4° & 6° S.	,,	3 to 2	,,	Sly.
,,	6° & 8° S.	,,	5 to 4	,,	,,
,,	8° & 10° S.	,,	5 to 3	,,	Ely. or N.Ely.

The prevailing current in this part is still westerly, though now inclined more to the southward, and its rate from 20 to 30 miles in 24 hours; it is strongest between 2° and 6° S., weakest between 8° and 10° S. There is a large percentage of smooth sea in March. The Remarks on Wind in square 303 show that ships which crossed the Equator between 29° and 30° W. were hampered by the land; so that it seems best to cross the Equator in 27° or 28° W.

Ships bound to the northward should cross the Equator between 26° and 30° W., this will enable them to avoid the north-easterly winds which are common in square 303, and, on the other hand, the light north-westerly winds and calms which are common on the eastern side of square 3.

April.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, for although the N.E. trade is as strong on the eastern as on the western side of square 39, it is much stronger on the western than on the eastern side of square 3; they should then stand to the southward in about 26° W., taking the tack which gives the most southing when the wind draws southerly.

Referring to the eastern half of the April Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between	0° & 4° S.	the prob. is about	3 to 1	that it will be more	Ely. or N.Ely.
„	4° & 6° S.	„	5 to 3	„	„
„	6° & 8° S.	„	4 to 3	„	Sly.
„	8° & 10° S.	„	3 to 2	„	Ely. or N.Ely.

The prevailing current is still westerly at a rate of from 20 to 30 miles in the 24 hours, exceptional currents being stronger; it is strongest between 2° and 8° S. There is a good deal of north-easterly swell in the north-eastern part of square 303, and of smooth sea in its south-eastern part. Near the South American coast there is much light north-easterly wind, and it does not seem likely that a ship would have great difficulty in getting to the southward there, still the wind is lighter in square 303 than in square 302, and the Remarks in square 303, show that ships which cross to the westward of 30° W. are sometimes hampered, it would therefore be well not to cross the Equator to the westward of 27° or 28° W.

Ships bound to the northward should cross the Equator between 25° and 30° W., so as to avoid the large amount of light north-easterly wind which is recorded in square 303, and the light north-westerly winds and calms which are common on the eastern side of square 3.

May.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, where the May diagram and chart show the wind to be stronger than to the eastward. In square 3 the north-easterly wind prevails to 4° N., and is stronger between 25° and 30° W. than between 20° and 25° W.

Referring to the eastern half of the May Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between	0° & 2° S.	the prob. is about	2 to 1	that it will be more	Ely. or N.Ely.
„	2° & 4° S.	„	5 to 3	„	„
„	4° & 6° S.	„	5 to 4	„	Sly.
„	6° & 8° S.	„	2 to 1	„	„
„	8° & 10° S.	„	4 to 3	„	„

From October to April the wind draws more easterly in the southern part of the square, but from May to November it draws more southerly. The westerly current is stronger than in previous months, and frequently exceeds 30 miles in 24 hours, it is strongest between 2° and 6° S. The sea is also higher than in previous months. It may therefore be well for a dull sailing ship to make a little easting after passing the Cape Verde Islands, more especially as the Remarks on Wind in square 303 show that the wind, weather, and sea near the South American coast are very trying. In one case the ship crossed the Equator in 26° 18′ W., but still was much hampered. Hence it seems right that a dull sailer should not cross the Equator to the westward of 25° W. in

May. The Captain of a smart ship, when outward bound, may prefer keeping well to the westward, and risking the detention near Cape St. Roque.

Ships bound to the northward should cross the Equator between 25° and 30° W., thus avoiding the unsettled wind and weather near South America on the one side, and the large amount of calm and light N.W. winds in the eastern half of square 3 on the other. The Diagram shows that the prevailing south-easterly wind is stronger, as well as being more settled, between 25° and 30° W. than between 30° and 35° W., especially in the southern part of the district.

June.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, where the wind is stronger than to the eastward of them, and steer to the southward in about 26° W., standing to the S.E. with the first of the southerly wind which they will probably meet with in 6° N., and keeping on the starboard tack, if they can make southing, until they have made a fair amount of easting, as the Remarks on Wind, in squares 302 and 303, show that ships should not cross the Equator to the westward of 28° W., and it would be all the better if they crossed two or three degrees to the eastward of that meridian. Between 8° and 4° N. the prevailing current will probably be easterly, but South of 4° N. it is likely to be very strong to the westward; the requisite easting should therefore be made on getting the first of the southerly wind, as the S.E. trade becomes more easterly near the Equator.

Referring to the eastern half of the June Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between 0° & 4° S. the prob. is about 4 to 3 that it will be more southerly.
„ 4° & 6° S. „ 3 to 2 „ „
„ 6° & 8° S. „ 3 to 1 „ „
„ 8° & 10° S. „ 2 to 1 „ „

So that, as in May, the wind becomes more southerly in the southern than in the northern half of the square, especially between 6° and 10° S. The westerly current in square 303 is still strong, especially in the northern half of the square where it frequently exceeds 30 miles in the 24 hours. There is much southerly, and even south-westerly, sea in June. In cases of ships crossing the Equator, all those in square 303 show the importance in crossing well to the eastward.

Ships bound to the northward should cross the Equator between 25° and 30° W., so as to avoid the unsettled wind and weather, which are more extreme near the South American coast than farther to the eastward, and on the other hand to get a more steady N.E. trade after passing 6° N. than exists farther to the eastward.

July.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, where the N.E. trade is stronger than to the eastward. On getting the first of the southerly wind, in about 10° N., they should stand to the south-eastward, making all the requisite easting in the northern part of the southerly wind as it draws more easterly near the Equator. Between 10° and 4° N. they will probably experience an easterly current, but this will help them to the windward, and place them in a better position for dealing with the very strong westerly current which prevails, after passing to the southward of 4° N.

Referring to the eastern half of the July Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between	0° & 2° S.	the prob. is about	2 to 1	that it will be	more southerly.
„	2 & 4° S.	„	3 to 1	„	„
„	4° & 6° S.	„	5 to 1	„	„
„	6° & 8° S.	„	6 to 1	„	„
„	8° & 10° S.	„	3 to 1	„	„

Showing that the wind is much more southerly than in June. The wind is more southerly in July than in any other month. The westerly current in square 303 is still very strong, especially in the northern half of the square, where the mean of four or five observations is sometimes 35 miles in 24 hours! There is also much southerly sea in July. The Remarks on Wind, square 303, give cases of ships which had crossed the Equator to the westward of 30° W., getting hampered by the South American coast. The wind is also much more squally and unsettled in square 303 than in the squares to the eastward of it, so that ships will do well not to cross the Equator to the westward of 25° to 28° W. in July.

Ships bound to the northward may be guided very much by the longitude in which they approach the Equator; those from the eastward may cross between 20° and 25° W., as the southerly winds are slightly stronger on the eastern than on the western side of square 3, but they should be in 25° W. when in 10° N., so as to get a better N.E. trade than that which exists farther East. Ships from the westward would do well to cross the Equator and stand to the northward in about 30° W.

August.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, where the N.E. trade is stronger than to the eastward of them. On getting the first of the south-westerly winds in about 10° or 12° N., they should stand to the south-eastward, not fearing the effect of the easterly current which prevails between 10° and 4° N., as a pretty strong westerly current may be expected to the southward of 4° N. The Diagram shows that the prevailing southerly wind becomes more easterly as the Equator is approached, so that the requisite easting should be made with the first of the southerly wind, and as the winds near Cape St. Roque are more southerly and unsettled than they are farther to the eastward, it is important to cross the Equator well to the eastward, say in 25° or 26° W., or even two or three degrees farther to the eastward.

Referring to the eastern half of the August Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between 0° & 6° S. the prob. is about 2 to 1 that it will be more southerly.
,, 6° & 8° S. ,, 5 to 1 ,, ,,
,, 8° & 10° S. ,, 2 to 1 ,, ,,

The wind is still remarkably southerly between 6° and 8° S., off the most eastern part of South America. The westerly current is still strong; strongest in the northern half of the square. Southerly and confused swells are very frequent. The Remarks on Wind, square 303, give cases of ships that were hampered by the South American land; one, a fast iron ship, having crossed the Equator as far East as 27° 22′ W.

Ships bound to the northward should avoid the South American land, as the wind is lighter to the westward of 33° W. than it is to the eastward. They should be in 25° W., or farther West, on crossing the parallel 10° N., as the N.E. trade is stronger, and extends farther South on the western side of the district than it does near the Cape Verde Islands.

September.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, where they will have a better N.E. trade than to the eastward. On getting to the south-westerly wind in 10° or 12° N., they should stand to the south-eastward; that wind, with the prevailing easterly current, will carry them fast to the eastward, but the Diagram shows that to the southward of 4° N. the prevailing wind is south-easterly, and the current westerly, which will carry them fast to the westward.

Referring to the eastern half of the September Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between 0° & 2° S. the prob. is about 3 to 1 that it will be more southerly.
,, 2° & 4° S. ,, 2 to 1 ,, ,,
,, 4° & 8° S. ,, 3 to 1 ,, ,,
,, 8° & 10° S. ,, 2 to 1 ,, ,,

The prevailing current is westerly from 20 to 30 miles in the 24 hours, the difference of its speed in the northern and southern halves of the square is not so great as in previous months. The sea is still very southerly and confused. The Remarks on Wind, square 303, give cases in which ships were hampered off the South American coast; in some cases after crossing the Equator in 27° W., so that it would be well to cross in 26° W., or farther to the eastward.

Ships bound to the northward are not likely to meet with north-easterly winds near the coast of South America, still it seems well that they should cross the Equator to the eastward of 30° W., as the winds in square 4 are lighter than those in square 3. The eastern and western sides of square 3 seem to have equally good winds for getting to the northward, but it may be well for ships from the eastward to cross the Equator in about 25° W., as the winds are stronger on the western than on the eastern side of square 39.

October.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, where the N.E. trade is stronger than to the eastward, and steer South until they meet the first of the southerly wind in or about 8° or 7° N., then stand to the south-eastward until the wind changes, so that they can make the most southing on the port tack. The prevailing current is easterly between 10° and 6° N., but westerly farther to the southward.

Referring to the eastern half of the October Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between 0° & 2° S. the prob. is about 3 to 1 that it will be more southerly.
„ 2° & 6° S. „ 2 to 1 „ „ „
„ 6° & 8° S. „ 4 to 3 „ „ E. or N.E.
„ 8° & 10° S. „ 4 to 1 „ „ „

Here, for the first time since April, the wind gets more East or N.E. in the southern than in the northern and central parts of the square. The current is still westerly from 20 to 30 miles in 24 hours, and stronger in the northern than in the southern half of the square. Southerly seas are very frequent in the southern part of the square. The Remarks on Wind, square 303, give cases of ships crossing the Equator in 30° W., or farther West; all but the last were hampered by the land, so that 28° W. seems a safer limit in October, though the Wind Chart and Remarks show that the winds near South America are more favourable for getting to the southward in that month than they have been since April.

Ships bound to the northward whilst South of the Equator will find stronger winds between 25° and 30° W. than in any other longitude; after crossing the Equator they will find the southerly wind stronger and the N.E. trade stronger and more easterly in that longitude than they are farther to the eastward.

November.

Ships bound to the southward should certainly pass to the westward of the Cape Verde Islands, for although the Diagram shows that to the southward of 16° N., the *prevailing* wind is slightly stronger in the western half of square 39, the amount of calm is greater in the eastern, especially between 14° and 16° N.; and the mean force of *all winds* is greater in the western half. After passing the Cape Verde Islands, it may be well to haul slightly to the eastward, so as to be in 25° W. when in 5° N.; and then, with the first of the southerly wind, to take the tack which gives the most southing, endeavouring, if possible, not to cross the Equator to the westward of 29° W. A slight easterly current will probably be experienced between 10° and 4° N.; in other parts it is likely to be westerly.

Referring to the eastern half of the November Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between 0° & 2° S. the prob. is about 5 to 3 that it will be more southerly.
" 2° & 4° S. " equal that it will be more southerly or easterly, or north-easterly.
" 4° & 6° S. " 2 to 1 that it will be more easterly or north-easterly.
" 6° & 8° S. " 5 to 1 " "
" 8° & 10° S. " 11 to 1 " "

In November the tendency in the wind to become more easterly or north-easterly in the southern part of the square is very decided. There is still a westerly current of from 20 to 30 miles in 24 hours, and sometimes it exceeds 30 miles; it is strongest between 2° and 4° S. The per-centage of south-westerly current is greater in the southern part of the square than in previous months. Smooth seas are much more frequent than in previous months, especially in the southern part of the square. The Remarks on Wind, square 303, give cases of ships which crossed the Equator in 30° W., or farther West; all, excepting the last two, made very fair passages to 10° S.; one, a dull sailer with light winds, whilst the other, though a fast ship, was very much hampered, but she crossed the Equator in 33° 50′ W.; so that a good sailing ship need not fear crossing in 31° W. if driven to do so by circumstances.

Ships bound to the northward should cross the Equator between 25° and 30° W., as by doing so they will avoid the lighter winds which prevail near the South American land on the one side, and also those which exist in the eastern halves of squares 3 and 39 on the other, beside getting a more easterly N.E. trade.

December.

Ships bound to the southward should pass to the westward of the Cape Verde Islands, where although the wind is much more easterly than it is to eastward of them, it is decidedly stronger. On the eastern side (between 14° and 16° N.) the wind chart of square 39 shows that there is 15 per cent. of calm. These ships should haul a little to the eastward after passing the islands, so as to take the first of the S.E. trade in about 25° W., or slightly farther East; then take the tack which gives the most southing. The prevailing current is westerly throughout this route, and, as the Diagram shows, averages 25 miles in 24 hours near the Equator, so that a dull sailer, which is not weatherly, should make rather more easting before getting the S.E. trade.

Referring to the eastern half of the December Wind Chart for square 303, and taking S.E. by E. as a central point; then, when the wind is not from that point—

Between 0° & 2° S. the prob. is about 3 to 2 that it will be more easterly or north-easterly.
" 2° & 6° S. " 2 to 1 " "
" 6° & 8° S. " 3 to 1 " "
" 8° & 10° S. " 6 to 1 " "

In December the tendency for wind to be more easterly or north-easterly than S.E. by E., when not from that point, prevails throughout the square. The current is still westerly, averaging from 20 to 30 miles in 24 hours, and sometimes exceeding 30 miles; it is strongest in the northern half of the square. There is still much smooth sea in the southern part of the square. The Remarks on Wind, in square 303, give cases of ships which crossed the Equator in 30° W. or farther West, they all had to tack off the land, and would no doubt have done better if they had not crossed to the westward of 29° W. One ship was so hampered by southerly winds and westerly currents near South America that she stood to the north-eastward, and *re-crossed the Equator* to make easting, not getting to 10° S. before 25 days after her first crossing ! !

Ships bound to the northward should cross the Equator between 25° and 30° W., thus avoiding on the one hand the lighter winds which prevail near the coast of South America, and on the other the light winds and calms which are more common on the eastern than on the western side of square 3. On the western side of square 39 the winds are very favourable for going to the northward, but quite the reverse on its eastern side.

3. FROM THE EQUATOR TO THE BRASILIAN PORTS, ETC.

There is no difficulty in making any of the ports after having passed through the doldrums, and having cleared Cape San Roque and the dangerous Rocas, of which a description is given presently. A general S.S.W. course will carry you onward, and when you cross the Equator to the West of 29° W., draw a line from the point of crossing to Cape St. Augustine, lat. 8° 21′ S., and aim to keep to the eastward of it, and for this purpose take advantage of all slants. You should aim generally to make easting, when easting becomes necessary after crossing the line, before crossing 7° S.—*Maury.*

Bahia to Rio.—Captain Mouchez has given the following remarks. There is no difficulty in running down the coast from Bahia to Rio Janeiro; it is only in the months of May, June, July, and August, that any contrarieties occur, and gales from the South are encountered. But it is at this season that the winds hold most to the southward, being not usually more than E.S.E. or E. by S. Advantage should be taken of the S.W. squalls, which frequently occur, to get off the land, if you should be too close in. You may either pass through the Abrolhos Channel, or outside the group, according to the position from which they are approached. The greatest chance of meeting with contrary winds from the S.W. is in the parallel of Cape San Thomé, and this is most probable in June. At 250 or 300 miles off the capes the chances of these adverse winds is not more than half of that near the land. Nevertheless, Cape Frio should be closed with, because no benefit can be gained by keeping off the shore thereabout. In all other seasons the wind is right for running down the coast.

Rio to Bahia.—The greatest difficulties on running up from Rio to Bahia are encountered in November, December, January, and February, for during these months the N.E. winds blow very fresh along the coast, especially about Cape San Thomé. The wind-charts show that the trade wind has less northing in the offing than on the coast. It is therefore advisable to take the port tacks aboard, and make a stretch of 450 to 600 miles to the E.S.E. before coming round on the starboard tack. The winds will then be found less adverse, and the northerly current much less rapid, for when the trades blow strong the current runs at 1 to 1½ mile an hour along the coast, but this velocity is much less close inshore. November, and especially December, are the most unfavourable, and therefore it is necessary to prolong this eastern board to the utmost that may be considered necessary. In the other months of the N.E. monsoon—or October, January, and February—it is not necessary to go further East than to gain the Abrolhos on the other tack; for the wind observations show that beyond the parallel of these islets the direction of the trade wind, being from E. or E. by S., is always favourable for going to Bahia.

During the rest of the year, that is from March to October, in running up the coast keep as close as possible to the shore, not more than 30 to 60 miles off, and do not run off to the East, unless compelled to do so by strong N.E. winds off Cape Frio or San Thomé. This frequently occurs in the S.W. monsoon, but then it only lasts two or three days, and gives way to calms and quiet weather, with variable winds from S.W. to S.E. By manœuvring thus, and taking advantage of these slight shifts of wind, more frequent near the land than off it, you may make all possible way by means of the trade wind which comes from E. by N. to E. by S. The distance is also shorter, for instead of running eastward for 600 miles to gain a point 600 miles to North, you have only the direct distance to work, and it is also uncertain whether favourable winds will be met with outside.

Between Bahia and Cape San Thomé the variations from the land and sea breezes must not be reckoned on; they are not met with, especially in the bad seasons; the land in general is too low and too wet to affect the direction of the wind.

Routes for Steam-vessels between Bahia and Rio.—Steamers should as a rule, follow the shortest practicable route. Between Rio and Bahia the best course is within sight of the land, but as this may cause some anxiety from the projecting points, which must be doubled, a few words of advice will follow, which may serve to give confidence.

From Bahia to Rio a steam-vessel should steer South *true* up to lat. 16° S., when she will have run 180 miles; then steer S. ½ W. directly for the lighthouse on the Abrolhos, and when having made 118 miles good in this direction, should be abreast of these islets. This track will follow the coast at 24 to 27 miles distant, as far off as it can be seen; during the day you may steer 2° or 3° to starboard, so as to make the land out better; by night keep as much to port, particularly if the easterly breeze is fresh, as its force will counteract the drift land wind. Having reached lat. 16° 30′, if there is any doubt as to your position, and the weather clear, bear in a little to starboard, so as to endeavour to make out Mount Pascal to the S.W., which would be seen as a small rounded pap rising above the horizon; if this is seen it will be 48 or 50 miles off, and you will be exactly on the meridian of the Abrolhos in lat. 16° 30′. The Abrolhos light should next be seen by night, or the tower, like a ship under sail, by day; then steer so as to leave the islets 12 miles to the West.

Beyond the islets the *true* direct course is S. 24° W., to pass 6 miles East of Cape San Thomé, in 22 or 25 fathoms, the distance 270 miles. On this track the land will not be visible until near the Rio Doce, when the breakers may be seen on the bar. The low land of Cape San Thomé perhaps will not be visible. At night keep 2° or 3° to port of this route, and keep the lead going when near to the approaching points, so as to lose no ground, nor to approach too near. It should also be ascertained whether the current is running to S.S.W. or S.W. so strong as to make you overrun your reckoning.

From a point 6 miles East of Cape San Thomé in 25 fathoms, the direction and distance to Cape Frio are S. 52° W. 91 miles, it may be passed as close as you please, and may be discerned 35 or 40 miles off. By day there is no difficulty; by night it is better to keep off 3° or 4° to avoid the indraught of the Gulf of Macahe, and also to gain an earlier sight of the lighthouse, which, being on the South point of Cape Frio Isle, is masked by the East point when to northward of N. 45° E. from the light. From Cape Frio to the Sugar-loaf at Rio is 65 miles, and the whole distance to be traversed, the shortest which can be followed by a steamer between Point San Antonio and Bahia is 724 miles.

From Rio to Bahia.—Leaving Rio in a steam-vessel steer for Cape Frio, passing it close-to; but if fresh N.E. winds are encountered, it will be better to keep about 2 miles off the cape, because the sea is frequently very heavy near it at such times. Thence steer N. 52° E. to double Cape San Thomé, as before stated. If it is daylight the position may be rectified by a bearing of Mount Sao Joao de Frade de Macahe, or the small Mount of Itahoca. The latter is remarkable, rising out of the marshy plain, and generally visible. The low land of Cape San Thomé should not be seen on this track, which ought to take the ship 12 miles off; should it be seen, you will have been drifted to N.W., and should haul off to the eastward; the depth should never be less than 25 fathoms. Keeping some miles to the East of the banks of San Thomé, in 28 fathoms, run to N. 24° E. towards the Abrolhos, using the same means and precautions as mentioned for the reverse route.

There is an especial advantage in passing through the Abrolhos Channel, in going northward, because for 60 miles or more the sea is much quieter than outside the reefs, which serve to shelter the passage. Beyond the Abrolhos proceed as directed for the downward track, correcting the route by sighting the land by day, or by the lead in the night.

4. FROM THE EQUATOR TO AND AROUND CAPE HORN.

There is but little choice in making this passage. The most direct course is almost the only one that can be taken. The land of South America on the one hand, and the S.E. trade winds on the other, leave little scope for variety, as far as the latter is encountered. In a former page it is said that the great circle which passes through the Lizard and Cape Horn cuts the Equator in 31½° W., and passes near to Pernambuco and near to Rio Janeiro, towards the Strait of Le Maire. Although this is too far West on the Equator, the track of this corrected would be the best which could be followed to the South American ports and around Cape Horn.

"The sum and substance of the best sailing directions from the 'fair way' off St. Roque, round Cape Horn to the Pacific, amounts simply to this: from the parallel of St. Roque make the best of your way South, keeping a good offing from the coast; always pass inside of the Falkland Islands; and when the wind will allow, go through the Straits of Le Maire, and hug close around the cape, aiming to get to the West as fast and as soon as possible. Occasionally ice is met with East of the Falklands, and that is another reason why outward-bound vessels should prefer to go inside of these islands."

After having cleared the Rocas and the dangerous banks, now well surveyed, which lie off Cape San Roque, as described in a later part of this work, the remarks on proceeding from Bahia to Rio, before given, may be observed. The same reasons hold good as far as the Rio de la Plata, and hereabout the S.E. trade will have failed, and is replaced by the calm westerly winds described on pages 82—90, &c.

We give Captain Maury's remarks on this route, and they will be perused with interest:—

Vessels bound round the cape should first, after leaving Cape St. Roque, aim, if the winds will let them, to cross 25° S. in about 35° W. At any rate, they should run down the coast, keeping as far off the land as, with a good clean rap-full, they can, without going to the East of 33° 34′.

After crossing the parallel of Tierra del Fuego, the difficulty is to get to the westward. Therefore, aim always to pass *inside* of the Falkland Islands, and, if wind and daylight serve, through the Straits of Le Maire; for it is better to make westing on the North side of their parallel of latitude, when it is practicable, and where the weather is mild, than to put it off for the stormy latitudes, South, where it is more difficult.

Captain Smyley, engaged for many years in the seal fishery of the South Seas, has furnished some remarks in relation to this part of the ocean. He says, "As for a vessel getting blown on shore on the coast of Patagonia by N.E. gales, it is out of the question. I have spent twenty-two years of my life mostly from South Shetland to the River La Plata, and once I remained six years without coming North of 41° South, and I cannot say that I ever knew, during that time, the wind to blow heavily directly on shore for twelve hours. My voyages being principally made for sealing or whaling caused me to keep close into the coast, whereby I had the best opportunities for observing the weather, currents, tides, &c.; in fact, my voyages depended partly on these, and it stood me in hand to make myself acquainted with them.

"I have always found that the sooner I get to the westward, after crossing the line, the better. I always try to make the Peninsula of St. Joseph's, between New Bay and Port Valdez. The land is high, steep clay cliffs, flat on top. Then I endeavour to keep near enough to see the land until I get well to the South, so as to pass close to Staten Land; by doing this, I have smooth water, winds from N.W. to W.N.W., and pleasant weather; while another vessel will have the wind from W.N.W. and S.W. off the Falkland Islands, and on the South side of the islands the wind will be from S.W. to S. When bound to Shetlands, from the Cape, or from Staten Land (Shetland is our rendezvous, on account of getting wood there to last until our return), we always find, after passing the latitude of 60° South, the weather much milder, fewer blows, but more fog. The currents, as well as the winds, are generally the reverse of what they are off Cape Horn. The prevailing wind at Shetland is N.E., while in the track generally taken by vessels it is S.W. The current is similar, for it seems more like a gulf stream than a common current following the direction of the wind.

"No navigator should be afraid to approach the coast. Soundings are found far out; the water is much discoloured, as the land is neared; and we have another sign, which seldom fails in the day time, *i.e.* the small gulls, which will always be found within 40 or 50 miles of the coast, making their presence known by the noise they make as soon as the vessel is perceived. This seldom fails to be the case.

"The navigator should not be backward in tacking as soon as he finds himself getting off shore, for the wind will often lead him along for two or three points, and then favour him for a short distance again, by which means vessels often get so far to the eastward as to lose much time. I would always recommend a ship to tack in shore, even if she could make no better than a W.N.W. course, in preference to going to the eastward; for by keeping well in, she will have smooth water, clear weather, and wind more off shore. While, on the other hand, when she nears the Falklands, she would begin to have fogs, rain, and sleet; and South of the islands the rain becomes hailstones and snow. A short distance in these latitudes makes a great difference in wind, weather, and tides.

"For comparison, take Santa Cruz Harbour, on the coast of Patagonia, lat. 50° 8′ S., long. 68° 21′ W., tide in spring, 48 ft. The Jason Islands, belonging to the Falklands, lat. 51° S., long. 61° 20′ W., tide but 6 ft. Here is a great difference in 7° of longitude, about 260 true miles. This will show the extraordinary difference made in tides by a short distance, and the weather in proportion to the tides; on the one it is seldom known to rain, at the other it rains half the time. At the Straits of Magellan, in a similar way, it seldom rains at the eastern entrance, and at the western it seldom stops; but this is owing more to the mountains leading from Cape Forward along the straits, and from thence to Cape Tres Montes, or Chili."

"I think," says Capt. E. H. Linnell, "the Straits of Le Maire should be passed near to the Tierra del Fuego shore, and continue along the shore until well to the West; by so doing, I have found an eddy current to the West; this being the fifth time I have found this to be the case. Since 1845, I have been navigating these waters, mostly in the Chili trade, and I am confident that my passages have been shortened by keeping near the land."

Captain Maury continues:

"The opinion expressed by these navigators as to the Cape Horn route, are fully confirmed by the pilot charts; and though sometimes a vessel, by going to the East of the Falklands, may have good luck, fine weather, and a short passage, it should be considered the exception, but by no means as the rule. The combined experience of all the Cape Horn navigators whose journals have been consulted during the progress of my investigations, is against the eastern, and in favour of the western, or in-shore passage, as a general rule.

"Cape Horn navigators should not forget that the prevailing winds encountered in doubling the Cape are westerly winds; that the Andes, which in fact terminate only with the continent, stand up as a barrier to these winds; and consequently these winds come round the cape in violent sweeps, puffs, and gales, as they do around a bluff point of land in a harbour, or the corner of a building on shore. The strength of these sweeping winds is probably felt with more force near the cape than it is at a considerable distance off, and out of the influence of the land upon the course and velocity of the wind.

"Hence the earnest recommendation to navigators to pass through the Straits of Le Maire, if practicable, and if they can accomplish it by daylight, for the currents are not unfrequently strong and conflicting there; to hug the cape as closely as the winds on one hand and the rocks on the other will allow, and so make westing down there where the degrees are short, as fast as, without fighting adverse winds and weather, they may do, until they cross, if bound to California, the parallel of 50° S., between the meridians of 80° and 90° W.

"But if, after getting through the straits, and before doubling the cape, a westerly gale strike them in the teeth, then, instead of stopping there off the pitch of the cape to fight against it, with the intention of holding their own until the gale abates, or the wind slants so as to let them get round, I think the chances would be altogether in their favour by sticking her away South, under the expectation that they would soon get out of the strength of the winds, which, eddy-like, come sweeping around Cape Horn, sometimes at one distance, sometimes at another, according to the direction of the gale. But even in doing this, the navigator who is desirous of making a quick passage, will not fail to take advantage of slants. He will always prefer, until he doubles the cape, the tack upon which he can make the most westing. Vessels intending to touch South of Valparaiso, or any of the Intermedios, need not care to get so far West while they are South of the parallel of 50°, even when the winds are fair, as vessels that are bound further North, as to California, for example. Let these last make westing whenever they can, without making southing also. They cannot well cross the parallel of 50° S. too far West, on their way to California, provided they keep to the East of 100° or 110°.

"The pilot charts of the South Atlantic and Cape Horn, in addition to the track charts, leave but little more to be said with regard to the passages West, around Cape Horn, than may be gathered from the injunction—Study the pilot charts.

"I think that I may now congratulate navigators, especially those who are co-operating with me, and whose labours have enabled me to bring about these results, upon the present state of our knowledge with regard to the route to the 'fairway,' off St. Roque, and thence round Cape Horn.

"This route, I think I may be permitted to say, without incurring the imputation of self-praise, is as well understood as it is possible for any route across the ocean to be, that is governed and controlled by the force of winds and currents alone.

"The average of vessels under canvas from the parallel of St. Roque to 50° S. on the Cape Horn passage, is only about 100 miles a day. The intelligent seaman needs no other sailing directions here than simply—'Make the best of your way South.' Of course he will understand that this 'best way' is not to be supposed to lie so close along with the land as to bring him within the influences of the land breezes and the calms of the coast.

"Besides this injunction there is but another simple caution to add, and that is, when you arrive at the calms of Capricorn do your best to get South; for, by that course, it is easiest to clear them. As to the parallels between which, at the different seasons of the year, you may expect the calms, see the trade wind chart.

"From 50° S., East of Cape Horn, to the same parallel West, lies the rub —so it is supposed. Along this part of the route the prevailing winds, it is true, have westing in them, and are, therefore, in a great measure, head winds. How to overcome them depends on the skill of the navigator. The grand object of this work is to let the navigator know how he may expect to find the winds, which way the currents; taking it for granted that, when he knows this, his own skill and intelligence will best guide him as to the rest."

In the resumé of the passages from Cape San Roque to 50° S. in the Pacific, a large number are quoted and discussed by Capt. Maury, who gives the following tabular results and remarks:—

RESUME' OF CAPE HORN CROSSINGS.

Days from	January.	Feb.	March.	April.	May.	June.
St. Roque to 50° S.	25·0	26·6	27·3	30·2	29·7	29·3
50° S. in Atlantic to 50° S. in Pacific	16·7	17·6	18·2	17·	18·8	15·6
St. Roque to 50° S. in Pacific ..	41·7	44·2	45·5	47·2	48·5	44·8

Days from	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Means.
St. Roque to 50° S.	29·6	31·8	26·9	26·2	24·3	25·7	27·7
50° S. in Atlantic to 50° S. in Pacific	18·3	17·	20·1	18·8	20·4	15·7	17·8
St. Roque to 50° S. in Pacific ..	47·8	48·8	47·	45·	44·7	41·4	45·5

From the parallel of Cape St. Roque to the parallel of 50° South, at the usual crossing place for the Cape Horn trader, is about 2,900 miles—not quite the distance from New York to Liverpool. And the most striking feature in this table is perhaps the length of the time between these parallels.

The distance from the average crossing of 50° in the Atlantic, around the Cape, to the average crossing of the same parallel in the Pacific, is nearly half the distance from the parallel of St. Roque to the Atlantic crossing of 50° South, and the time occupied around the Cape is, considering winds and sea, by no means disproportionate.

The average distance made good against the current around Cape Horn is 80 miles a day. The average distance from the parallel of St. Roque to that of 50°, through a mild climate, and with no such opposing current, is 105 miles the day. And the average distance made good by the "liners" (sailing vessels) *from* Liverpool to New York is 95 miles a day; *to* Liverpool, the average made good is 135 miles.

These Cape Horn crossings are derived from the mean of nearly 400 passages taken at random, and they give us, it may be supposed, what may be finally considered as a *fair* average, for it really only differs a "dog's watch" from the average, as stated in the seventh edition of this work, from the mean of 220 passages. So it appears that the passage from England to New York under canvas, in the winter time, is nearly as difficult as the passage around the Horn.

Navigators are recommended to give these tables an attentive examination, for they are instructive. January and December are good months from St. Roque around the Horn, giving an average passage of 41·5 days. February and November give only 3 days longer. March and October are still worse, the passage then being aggravated by the difficulties from the parallel of 50° in the Atlantic to 50° in the Pacific. The months from April to August are worse than all, and here the difficulty lies chiefly from St. Roque to the parallel of 50°, the average of that part of the passage being about 20 per cent. longer than it is in January. In March, May, and July, and from September to November, the doubling of Cape Horn is most difficult, the monthly average being between 19 and 20 days from the parallel of 50° on one side to the same parallel on the other. The best months for doubling it are from December to April inclusive, the average being about 17 days.

On the other hand, August gives the largest average from the parallel of St. Roque to that of 50°, and November the smallest. From March to August inclusive, the monthly mean for this part of the route is 29·3 days, while for the six other months the average is 25·8 days. Thus it ceases to be any longer a matter of opinion, for actual experience has decided that, as a rule, the months of the least daylight give the longest passages from Cape St. Roque around the Horn.

It is, however, useless to go into any further discussion of this table here. Every navigator can do that for himself. It is only necessary to call his attention to the *apparently* very tedious time* generally which navigators have from the parallel of St. Roque to that of 50° S.; how nearly all vessels pursue the same route, and how those vessels that go East of the Falklands, though they reach 50° sooner, lose all they gain in getting West after clearing those islands.

Take, as an instance, the ships which did this in July. Their average time to 50° S. in the Atlantic was 28, and then around the Horn 22 days; total, 50. The average of the inside ones for that month is 30 and 18 days; total, 48; or a gain of 2 days by passing inside of the Falkland Islands.

REMARKS BY CAPTAIN JAMES WEDDELL, 1822—23.

Many commanders of ships who have been successful in making a passage round Cape Horn to the westward, have treated with unmerited derision the accounts given by Commodore Anson of this navigation.

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* Average distances made good per day—from St. Roque to 50° S., 105 miles; from line to 38° S., 105 miles; from 30° N. to line (new route), 111 miles; ditto (middle), 97 miles; ditto (old), 89 miles; from the Lizard to 30° N., 110 miles; thence to line, 100 miles.

I am quite satisfied, from my own experience, that the month of March might be productive of all the distresses described by the journalist. Captain Porter, who passed the Cape in the American frigate *Essex* in March, 1814, says, "Indeed our sufferings, short as has been our passage, have been so great, that I would advise those bound into the Pacific never to attempt the passage of Cape Horn, if they can get there by any other route."

The difficulty, however, in making this passage is removed by choosing the proper season, which, when attended to, must at least save much time, and wear and tear of the ship. In the beginning of November the winds begin to draw from the northward, and continue to be frequent till about the middle of February, when they shift into the S.W. quarter; during these months the westerly winds are not lasting, hence the passage may be easily effected. From about the 20th of February to the middle of May the winds are generally between S.W. and N.W., and blow with great violence. During this interval no ship need expect to make a passage round the Cape that is not well equipped in every respect. From the middle of May to the end of June the winds prevail from the eastward, with fine weather. During these six weeks a vessel may round the Cape in sight of the Isles Diego Ramirez. In July, August, September, and October, the winds prevail again between S.W. and N.W., but August and September are more particularly tempestuous. In regard to the route which ships should take to round the Cape, much depends on the season of the year, as relates to the force of the prevailing westerly winds. I prefer, at all times, passing to the westward of the Falkland Islands; and, in the summer season, to pass through the Strait of Le Maire, as it saves 50 or 60 miles of westing, and can be attended with no risk, if you have sufficient daylight to see to run back through the strait, in the event of being caught with a southerly gale at the southern entrance.

From my having been engaged five years in navigating these seas, and having performed a passage of 26° of longitude direct to the westward about the parallel of Cape Horn during the stormy month of April, I am fully acquainted with the perils and inconveniences of this navigation, and can offer my experience with the confident expectation of its being found useful.

REMARKS UPON THE PASSAGE TO AND AROUND CAPE HORN, BY CAPTAIN P. P. KING, R.N.

Ships bound from the Atlantic to any of the ports in the Pacific will find it advantageous to keep within 100 miles of the coast of Eastern Patagonia, as well to avoid the heavy sea that is raised by the westerly gales which prevail to the eastward, and increase in strength according to the distance from the land, as to profit by the variableness of the wind when it is in the western board. Near the coast, from April to September, when the sun has a North declination, the winds prevail more from the W.N.W. to N.N.W. than from any other quarter Easterly gales are of rare occurrence; but even when they do blow, the direction being obliquely upon the coast, I do not consider it at all hazardous to keep the land on board. In the opposite season, when the sun has South declination, the winds will incline southward of West, and frequently blow hard, but as the coast is a weather shore, the sea goes down immediately after the gale. In this season, although the winds are generally against a ship's making quick progress, yet as they seldom remain fixed in one point, and frequently shift backward and forward six or eight points in as many hours, advantage may be taken of the change, so as to keep close in with the coast.

Having once made the land, which should be done to the southward of Cape Blanco, it will be beneficial to keep it topping on the horizon, until the entrance of the Strait of Magalhaens be passed.

With respect to this part of the voyage, whether to pass through Strait Le Maire or round Staten Island, much difference of opinion exists. Prudence, I think, suggests the latter; yet I should very reluctantly give up the opportunity that might offer of clearing the Strait, and therefore of being so much the more to the windward. With a southerly wind it would not be advisable to attempt the Strait; for, with a weather tide, the sea runs very cross and deep, and might severely injure and endanger a small vessel, and to a large one do much damage. In calm weather it would be still more imprudent (unless the western side of the Strait can be reached, where a ship might anchor), on account of the tides setting over to the Staten Island side, where, if it becomes advisable to anchor, it would necessarily be deep water and close to the land. With a northerly wind the route seems not only practicable, but highly advantageous, and it would require some resolution to give up the opportunity so invitingly offered. I doubt whether northerly winds, unless they are very strong, blow through the Strait; if not, a ship is drifted over to the eastern shores, where, from the force of the tides, she must be quite unmanageable.

Capt. FitzRoy seems to think there is neither difficulty nor risk in passing the Strait. The only danger that does exist, and that may be an imaginary one, is the failure of the wind. Ships passing through it from the South are not so liable to the failure of the south-westerly wind, unless it be light, and then a breeze will probably be found from N.W., at the northern end of the Strait. The anchorage in Good Success Bay, however, is at hand, should the wind or tide fail.

In passing to the leeward of Staten Island, the tide race, which extends to some distance off Cape St. John, at the N.E. end of the island, must be avoided; otherwise there exist no dangers.

The anchorage under New Year Islands, although it is a wild one, the bottom bad, and the tide very strong, yet offers good shelter from S.W. winds, and might be occupied with advantage during the existence of a gale from that quarter, which is so unfavourable for ships bound round the Horn.

After passing Staten Island, if the wind be westerly, the ship should be kept upon the starboard tack, unless it veer to the southward of S.S.W., until she reaches the latitude of 56° S., and then upon that tack on which most westing may be made. In this parallel, however, the wind is thought to prevail more from the eastward than from any other quarter. Never having passed round Cape Horn in the summer season, I may not perhaps be justified in opposing my opinion to that of others, who, having tried both seasons, give the preference to the summer months. The average of long days is certainly very great, but, from my experience of the winds and weather during these opposite seasons at Port Famine, I preferred the winter passage, and in our subsequent experience of it found no reason to alter my opinion. Easterly and northerly winds prevail in the winter off the Cape, whilst southerly and westerly winds are constant during the summer months; and not only are the winds more favourable in the winter, but they are moderate in comparison to the fury of the summer gales.

Having passed the meridian of Cape Pillar, it will yet be advisable to take every opportunity of making westing in preference to northing, until the meridian of 82° or 84° be reached, which will enable a ship to steer through the north-westerly winds that prevail between the parallels of 50° and 54°.

Being to the North of Staten Island for three days preceding full moon, which occurred on the 3rd of April, 1829, we had very foggy weather, with light winds from the eastward and northward, causing a fall of the mercury from 29·90 to 29·56. On the day of full moon the column rose, and we had a beautiful morning, during which the high mountains of Staten Island were quite unclouded, as were also those of Tierra del Fuego. At noon, however, a fresh gale from the S.W. set in, and enveloped the land with a dense mist. No sooner had the wind changed than the mercury rose to 29·95, but fell again the next morning; and with the descent the wind veered round to N.W., and blew strongly with thick cloudy weather and rain, which continued until the following noon, when the wind veered to the S.W., the barometer, at 29·54, having slightly risen; but after the change it fell, and continued to descend gradually until midnight, when we had a fresh gale from W.S.W. When this wind set in, the mercury rose, and continued to rise, as the wind veered, without decreasing in strength, to S.S.W., until it reached 29·95, when it fell again, and the weather moderated, but without any change of wind. During the descent of the mercury the sky was dull and overcast, with squalls of wind and rain, but on shore it seemed to be very fine sunshiny weather.

The column now fell to 29·23, and during its descent the weather remained the same, dull and showery; but as soon as the mercury became stationary, a fresh breeze set in from the southward, with fine weather.

After this, to new moon, the weather was very unsettled, the wind veering between South and W.S.W.; the barometer rising as it veered to the former, and falling as it became more westerly, but on no occasion did it precede the change. The mercury stands lowest with N.W. winds, and highest with S.E. With the wind at N.W. or northerly, the mercury is low; if it falls to 29 inches or 29·80, a S.W. gale may be expected, but it will not commence until the column has ceased to descend. It frequently, however, falls without being followed by this change. In the month of June, at Port Famine, the barometer fell to 28·17, and afterwards gradually rose to 30·5, which was followed by cold weather, in which the thermometer stood at 12°.

The difficulties which present themselves to the navigator in passing round Cape Horn, as well from adverse winds as the severe gales and heavy sea to which they are exposed, are so great that the Strait of Magalhaens has naturally been looked to as a route by which they may be avoided. Hitherto no chart has existed in which much confidence could be placed; but by the present survey the navigation through it, independent of wind and weather, has been rendered much easier, since a correct delineation of its shores, and plans of the anchorages, have been made; and sufficient descriptions of them have been given to assure the navigator of his place, and furnish him with advice as to his proceedings. The local difficulties, therefore, have been removed; but there remain much more serious ones, which I should not recommend a large, or even any but a very active and fast-sailing square-rigged vessel to encounter, unless detention be not an object of importance.

Further remarks and instructions for the passage around Cape Horn, and for the Strait of Magellan, are given in our DIRECTORY for the SOUTH PACIFIC OCEAN, 1877, pages 1043—1058, &c., to which the reader is referred.

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5. PASSAGE TO THE ISLAND OF ASCENSION.

Let a ship from England make the best of her way into the N.E. trade wind, and having gained it, pass well to the westward of the Cape Verde Islands, to avoid calms, and shape a course for long. 18° or 19° W. on the Equator; and so soon as she loses the N.E. trade wind, let every advantage be taken of making southing, without going farther West than 18° or 19° of West longitude. Being near the skirts of the S.E. trade wind, the wind will be found to blow from S. by W. to S.W. by S.; let her then stand on the starboard tack to make her easting in a track where there is smooth water and but little current, and cross the Equator in about 9° W., whence she will fetch Ascension, although she may not lay up for the island at first; for it is a general law within the limits of the trade winds, that their direction diverges, as from a centre of focal attraction, toward the coast of Africa as well as of America; and, consequently, a ship being on a wind will come up, or lay higher, the farther she proceeds.

On referring to the chart the track, as above described, will be seen; and the reasons will be clear, from the direction and set of the winds and currents, as described.

PASSAGES TO AND FROM ST. HELENA.

As St. Helena lies within the region and strength of the S.E. trade wind, it is to be reached in sailing ships from the northward by a circuitous route only, either eastward or westward of the island. The *Western Route*, which is always practicable, is nearly through the mid-ocean between St. Helena and the Brasilian coast, or rather toward the latter; thence south-eastward to the parallel of 23°, or thereabout, and again north-eastward and northward, so as reach, with the advantage of both wind and current, the windward or eastern side of the island. The *Eastern Route* is at times the best; and it is to be recollected that ships proceeding this way, in the proper season, will be materially assisted by the *Guinea Current* to the northward of the Line, as well as by the *Equatorial Current*, flowing to the southward of it, in a succeeding part of their route.

Captain Horsburgh has said: By various examples of ships that have gone by the eastern and western routes to St. Helena, combined with other information, it appears that the eastern route may be adopted in November, December, January, February, and March. If a ship, bound to St. Helena, cross the Equator in any of these months, and find the winds incline from south-westward, by standing to the S.E. across the Gulf of Guinea, close on a wind, and afterwards tacking as it veers to the East or West of South, she will most probably reach St. Helena in less time than if she had proceeded by the western route. From the time of losing the N.E. trade, 40 or 44 days to St. Helena may be considered a medium passage by the eastern route in these months, although it has been made in 31 days.

From the southern limit of the N.E. trade, the passage by the western route is seldom accomplished in less than 40 days. By this route 43 days seem about the medium passage; and during any month of the year it may be made in this time from the situation above mentioned. The *Arniston* once made it in 36 days, in May, &c., but she did not proceed more to the South than to 25° of South latitude; and the *Ceres* once made it in 21 days from the Equator, not going beyond 22° 15′ S. When the sun has great northern declination, the eastern route seems precarious; the western seems most certain at all times. A ship that sails indifferently, when close-hauled or in light winds, should not attempt the eastern route in this season; but one that glides fast through the water in faint breezes, and holds a good wind, may probably proceed by the eastern route in any season with safety. It has been the practice with ships going the western route to run far South, sometimes to latitude 32° and 33°; but this can seldom be requisite, and it lengthens the passage. The ships which have not proceeded so far South have generally made the best passages to St. Helena.

Before the use of chronometers and lunar observations, navigators were directed, in running to St. Helena, to fall into its parallel 180 or 200 miles eastward of it, to lie by in the night, and steer West in the day till they made the land; this practice is no longer requisite, for most of the East India ships, homeward bound, now steer a direct course from the Cape to St. Helena, and make the island by day or night; as they generally know the longitude within a few miles of the truth, there can be little danger of missing it, although this is barely possible, the body and leeward part of the island being frequently enveloped in fog clouds, particularly in the night. Should a ship, in such case, fall a little to leeward, she will seldom find any difficulty in working up to the anchorage, unless she sail indifferently upon a wind, for the current seldom runs *strong* to leeward near this island. This, however, may happen when the trade blows strong with squalls for a few days, which is sometimes experienced about the full and change of the moon; but this lee current is generally of short duration. I have seen ships from England make the island bearing E.S.E. directly to windward of them, at the distance of 45 to 54 miles; they sailed indifferently, but reached the anchorage the third day after making the island.

THE PASSAGE FROM ASCENSION AND ST. HELENA TO THE COAST OF AFRICA.

In proceeding eastward from these islands, it has been recommended, first, to bear to the southward, and then make the easting; but this, perhaps, is not necessary, and a more direct course is practicable. On this track the following observations by Commander H. J. Matson will be interesting:—

The compass direction of the winds I have scarcely ever found to vary in sixteen passages that I have made between the coast and the islands. It is easy to make the passage direct from the islands to the coast on the starboard tack; but until I made the passage from Ascension to the Congo, in February, 1840, it was the invariable practice of H.M. vessels to stand to the southward from Ascension until they could weather St. Helena, a dead beat of 700 or 800 miles. A stranger would certainly consider the latter to be the preferable route, for he would not believe it possible to reach Benguela (appearing to him 1,600 miles dead to windward) by keeping on the starboard tack; and the knowledge that the wind generally blows up the coast from the southward, with a lee current, would cause him to be more afraid of approaching the coast, and having to beat against it. Two precautions are, however, requisite, viz., not to go to the northward of 3° or 4° S., and not to bring your port to bear to the southward of S. 35° E. (true); an occasional short tack, as the wind veers a little, may therefore be necessary; but the whole passage may sometimes be made with a flowing sheet.

Horsburgh and others recommend vessels, even when bound from St. Helena to Benguela, to stand to the southward, and run their longitude down with the westerly winds, whereby the passage is more than doubled. This must have been owing to a want of knowledge of the prevailing winds between the islands and the coast, which, as before stated, vary very little in their direction 100 miles off shore.

6. EUROPE, ETC., TO THE GULF OF GUINEA AND WEST AFRICA.

The routes comprised under this head are more complicated and difficult than any other in the South Atlantic, and are indeed the only examples of adverse sailing, nearly throughout the year. Although the distance between the ports of Europe and Angola, or Benguela, are not greater than to Rio, the length of route to be traversed and the time occupied are very much greater. This is manifest and well known, when it is considered that the direct track crosses the belt of calms or doldrums against the African coast, described on pages 60—80, in its greatest breadth, and that after these are passed the wind and current are in dead opposition to a direct voyage. The case is somewhat different when the Gold Coast is the destination. In the ensuing remarks upon this topic we take much from the observations of Lieut. Brito de Capello, whose deductions on the winds and currents of this part have been before given, and which must be considered in connection with them.

There are two routes from Europe to the ports of West Africa. The first, or *Southern Route*, crosses the S.E. trades with the port tacks on board until they are lost in 25° to 30° S., then running down the easting on the starboard tack into the belt of South and S.S.W. winds which are found on the coast of Africa, by means of which the destination can be reached from the *southward*.

By the second route, the *Northern Route*, the zone of African calms is crossed nearly in its greatest breadth, until the S.W. winds of the Gulf of Guinea are reached; it is then continued along that coast, and the port is reached from the *northward*. Although this second route is not half the distance of the first, the time occupied in it is very far from being so disproportionate, and it is frequently or generally the case that the southern route is the quickest to the southern ports.

In taking the Southern Route, the directions for crossing the Equator, before given, are strictly applicable, the sole object being to gain the S.E. trades in the shortest possible time. When once within their influence, the best course must be laid to bear to the eastward in crossing them, and on arriving at their southern limit the ship may not be farther East than the meridian on which the Equator is crossed; but this is of less moment than if a point 5° or 6° farther eastward were attempted to be reached on that parallel, for this only represents about two days' sailing, while 10, 15, or even more days may be lost in attempting to cross the equatorial calms farther to the eastward, as before argued.

Having attained the variable winds on the tropic, whose limits shift with the season, the best of the way must be made to get to the eastward by their aid, and by means of the westerly anti-trades to the South of them. These have been described in the preceding part of this work. In running to the eastward, on a parallel South of the trade winds in the western part of the ocean, it will be found, as the African set is approached, that the trade and anti-trade winds have a more and more northerly tendency. (See Section 65, page 53, and Sections 93—97, pages 61—64, *ante.*) The South African current will also be generally found setting to the northward, as described on page 112, *ante*.

According to the sailing power of the ship, and the force and direction of the wind encountered, the course may be altered from easterly to northerly, when it is quite certain that the destination may be reached by means of this northerly wind and current. Although this may appear to be a very circuitous route, yet the comparative certainty that the voyage may be performed within a specified time, more than compensates for the uncertainty that must always be felt as to getting across the calm belt on the Equator at its greatest breadth.

This belt of calms increases in extent to the eastward of the meridian of 30°, varying with the seasons; its maximum breadth being generally in July and August.

On leaving the calm zone on the Equator, and reaching the S.E. trades, they are frequently found to be very much to the South, so that it is difficult at times to make better than a S.W. by W. *true* course; and as you will have to bear up against a strong westerly current, it is probable that by the time you gain their southern limit you will be very little to the East of the meridian on which you crossed the Equator.

The *Northern Route* demands more consideration, and will, perhaps, be best understood by referring to the diagrams of the winds, described on pages 60, *et seq*.

If the passage is attempted at the period when the N.E. trade wind is at its southern extent, it will be carried as far as 5° or 6° N., and all the rest of the voyage may be carried on a bow line. When the S.W. monsoon has set in North of the Equator, it must be made very much closer to the wind, for the monsoon is not generally so favourable as to let you double Cape Palmas, if the wind is not hugged sufficiently early. From Cape Palmas to the Angola Coast the wind is variable in its strength at all seasons, but it does not shift its direction much.

If the wind preserved an undeviating direction as far as the Angola Coast, and there were no currents to be crossed, it is certain that the number and length of the different tacks taken would be a matter of little consequence. But as the wind, as before shown (see pp. 60—64), follows different curved directions on either side of a central line, which runs diagonally from E.S.E. to W.N.W., on the land side, or to East of this line, they have a tendency more and more to the N.E., or blow from S.W. To the westward of this line of separation, on the other hand, they blow toward the N.W., or from S.E., being the regular S.E. trade wind. These two circumstances allow a good route to be laid with the starboard tacks on board, and which tack should not be abandoned except at the last extremity, for on this the ship will find the wind become more and more favourable as she advances: on the other, or port tack, they will become more adverse. Besides this, when the calm belt is crossed, the currents will also favour the eastern track, not merely for taking advantage of the Guinea Current (page 115), but to avoid the westerly equatorial current to the southward. Crossing the Gulf of Guinea in this manner, the coast of Africa, South of Cape Lopez, may be gained, and it is only needful to beat up in-shore to gain the port, for although the winds in the offing are not strong, generally lighter than near the land, yet advantage can be taken of the alternating land and sea breezes.

These are the general rules to observe, or otherwise the voyage may be unnecessarily lengthened, but they may be somewhat modified, according to the change of seasons.

The period of the monsoon, July, August, and September, is the best for the Northern Passage, for the winds, from 10° or 12° N., are generally fresh from S.W., and continue so throughout the Gulf. At this season it is well to cross the parallel of 14° N., in about long. 27° W., or even farther West, in order to clear Cape Palmas easily, as the current sets with considerable strength towards the land, or from the windward. In July the N.E. trade will probably be lost in 12° or 13° N. on that meridian, and then variable winds from N.W. to S.W. will be found. In August and September the N.E. trade is lost in 12° to 14° N., and in lat 13° N., long 28° W., the S.W. monsoon becomes much weaker, but it is necessary to keep to the westward to avoid being horsed by the Guinea Current; but when near Cape Palmas the wind will perhaps be more astern, and the N.E. and E.N.E. tendency of the current may be overcome; but perhaps you will not be able to get across the Equator West of the meridian of Greenwich. Eastward of this the wind tacks progressively, and, keeping on the same tack, you can generally get to 4° or 5° S., and from this you can work down in sight of land.

In the six months from November to April, the S.W. monsoon does not exist, and the routes to be followed are nearly the same in all, being only modified by secondary considerations; but during November and December the greatest delays and difficulties will be encountered in taking the northern route. At this time the triangular space of calms, abutting on the African coast, is at its greatest extent, and a ship must go as far as 28½° to cross it with any advantage, and then it will be a long beat up against light winds and dead calms, and the S.E. trades on their northern edge are very feeble. It is therefore scarcely advisable to attempt the northern route in these months, and certainly not unless the vessel is a good sailer, and is in good trim.

From January to April the southern limits of the N.E. trades and the calms remain about the same, but are more readily crossed as the season advances. From the parallel of 14° N. to Cape Palmas there is no reason why you should go so far to the westward, and if you can gain the parallel of 2° 30′ N. by a few boards to the South of Cape Palmas, it will be best. Storms are more frequent, and will allow the ship to run down the latitude with greater certainty than in the earlier part of the season.

In May and June the monsoon begins to be felt near the land, as far as 6° or 7° N., but it is better to run to the westward, and gain 9° N. between longitudes 22° and 24° W., when you may reckon on losing the N.E. trades, or rather the winds from the N.W., and cross the calms on a S.E. course, and by the time you gain the parallel of 6° N. you will encounter variable breezes from the S.W.

In October the monsoon is failing fast, and in the beginning of the month the course to be taken is similar to that in June. Having reached the monsoon, run with it to Cape Palmas, which can certainly be doubled on one tack. The route thence to the East is more easy than in June, as the winds are stronger and more favourable.

This very brief resumé of the routes described by Lieut. Brito Capello to the Guinea Ports, a very troublesome navigation, will be better understood by a reference to the diagrams before alluded to.

RETURN VOYAGE FROM WESTERN AFRICA.—Precisely as the outer voyage is difficult the homeward one is simple; the contrary winds and currents in the one case are useful aids in the other.

The simple rule is, in general, on leaving any part of the Angola Coast, to make direct for the Equator West of 24° W., so as to cross the doldrums in their narrowest part.

From December to April, when the calms are nearest to the line, cross it in 25° or 26° W., so as to cross the former between 27° and 28° in a N.N.W. direction. In May, June, October, and November, cross the Equator in 24° W. In July, August, and September, the Gulf of Guinea must be crossed in the strength of the S.S.W. wind, and so must the monsoon North of the Equator, by keeping closer to Cape Palmas. At this season it seems better to cross the Equator in 16° or 18° West, then to run N.W. by W. across the S.W. monsoon, with the wind free, after which the calms will be entered in about 30° or 31° W. between 11° and 15° N.; beyond this latter parallel the regular N.E. trade will be encountered, at first weak and irregular, but afterwards more settled.

7. RETURNING FROM BRASIL TO EUROPE.

As the land breezes of Brasil are nearly the same along the whole of the coast, and during the greater part of the year, the day and hour of departure may be always fixed. It has been noticed that these breezes rise during the night, and are generally very fresh during the early part of the day; as they continue for nine or ten hours, you have consequently every advantage for preparation, and for standing off to a distance from the coast, free from all local obstacles.

The Baron Roussin has treated rather copiously on the routes to be adopted in sailing from the different ports; but his rules appear to be such as will naturally suggest themselves to the mind of a seaman, on the consideration of the prevalent winds, currents, &c.

The strength of N.E. winds often forces vessels when bound from ports South of *Cape Frio*, on their return to Europe, to keep close on the port tack for 12 or 15 days, and descend to the S.E. or S.S.E. to the parallel of 28°, or even of 32°. In advancing from the southward, you ought to attain the meridian of, and sight the Island of Trinidad, in 20° 31′ S. and 29° 19′ W.; then tack about and leave the island on the starboard side, as you cannot always double the projecting points on the eastern shore. On proceeding hence, northward, the winds will be found nearly approaching East and S.E., and so facilitate the proper route. By acting in this way, it will rarely happen that you cannot pass to windward of the Isle Fernando Noronha, and cross the line between the 28th and 36th degrees of longitude (West of Greenwich), or, if circumstances require it, one or two degrees more to the West.

On quitting Pernambuco, or the points in its vicinity, you may not always be able to get to the northward on the starboard tack. The direction of this coast inclines from the North to the West, and the winds are mostly from the eastward; but, at the same time, you may gain a good offing in directing your course to the northward. Should, however, the winds not permit you to proceed freely on this route, it will be preferable to make a long board to the S.E., and then act according to circumstances.

8. BRASIL TO THE CAPE OF GOOD HOPE.

It has been shown that, during the greater part of the year, the S.E. trade wind fails about the tropic of Capricorn, or in lat. 23½° S., and that here the wind is found to veer from the eastward to north-east, and more northerly; the latter prevailing more than any other in the vicinity of the S.E. trade, down to the parallels of 34° or 35° S. between the American coast and the meridian of Greenwich.

A vessel from Brasil, therefore, having advanced to the southward of the S.E. trade, will probably in every season meet with brisk winds veering from N.E. to N.W., and sometimes even so favourable as from West and W.S.W. But those most prevalent are from between N.W. and North, accompanied with fine weather and smooth water. If cloudy weather accompanies these northerly or N.W. winds, there is a risk of a sudden shift to S.W. or South, which may happen instantaneously, and must be guarded against.

In some "Notes" on the voyage of H.M.S. *Thunderer* to the Mauritius and back, Mr. H. Davy, M.R.N., observes, "The winds varied in circles the very opposite to those of the North Atlantic, and the phenomena attending them, although in exact accordance, were also in opposition. The wind at South goes to S.E., East, North, and what in England would be termed backing against the sun; so also it happens that a vessel may be running with a westerly breeze, and be taken aback with a south-easter. In like manner a vessel in our Atlantic, running with a S.E. wind, is liable to be taken aback with a north-wester, and many a goodly ship has met her doom by these instantaneous shifts. In both hemispheres those changes are preceded by lightning, and to the careful seaman it is only needful to forego the run, and place the ship on the tack she must come up on."

A ship, by running to the eastward, in the track of these winds, gradually increases her latitude southwards, and often makes greater progress than by running down to 37° or 38°, where they may be found more westerly; for, although in these high latitudes westerly winds most prevail, the winds are very often unsettled, and sometimes shift around the horizon, in the course of the sun, every two, three, or four days, with intervening calms, particularly when prevalent from the south-westward. It is not, therefore, recommended to a ship to increase her latitude to more than 35° until she has reached the meridian of Greenwich; she may then, advancing toward the Cape, proceed into 36° or 37°; for southerly winds prevail around the Cape land from January to April, and sometimes in other months, and extend far to the westward, being commonly found between the Cape and the meridian of Greenwich; consequently it is prudent for a ship bound to the Cape, in this season, to increase her latitude to 35° or 35½°, on coming into East longitude. By thence keeping that parallel till in about 17° E. she will make the land, and enter Table Bay or False Bay, according to the directions given hereafter.

9. THE ROUTES OF STEAM VESSELS BETWEEN ENGLAND AND THE CAPE OF GOOD HOPE.

By Commander Fishbourne, R.N.

Some steamers have taken the eastern passage to the Cape of Good Hope, erroneously considering that they will invariably have land and sea breezes to aid them to the southward, and that they will be enabled to get fuel, not only in sufficient quantity, but with facility. The green wood which is to be had is a very insufficient fuel for obtaining full steam, and even this is not to be procured without delay. It is far better to coal at Ascension; but even this delay may be avoided by husbanding fuel on the passage from England.

For instance, let a vessel leave England with fourteen days' coal on board, and have also the ordinary amount of sail that our men-of-war steamers have, such as the *Vixen*. Then, working expansively, and taking advantage of the winds, she need not expend more than seven days' coal before she arrives in the S.E. trade, from which she must sail, with one engine going, to the southern limits, which may thus be reached by vessels such as the *Vixen* in eight or nine days; and the westerly winds may be reached in one day more, having expended there from twelve to thirteen days' coal. These westerly winds will run her to the Cape in eight or nine days, or even to a position to fetch Mauritius with the S.E. trade in five days more. If she be bound to China, this would be advisable; though in following this route she may have gone much to the southward of her direct course to the Cape, she will yet have attained to a latitude in which the degrees of longitude are so short as nearly to compensate for that but apparent great difference. Now, let it be supposed that the same vessel shall have gone to Ascension with only the same consumption of coal, or two days' at least more. If she objects to make the detour necessary to fetch it under sail, this she cannot effect under two or six days more time. She will not then complete her coaling, in the first case, under six days, and in the second case, under eight days. She will not then reach the Cape of Good Hope, if she steer direct, in fourteen days' time, and may be blown off by a south-easter, and then have to stand to the southward under sail, her coal being expended; while if she shape her course to the southward of a great sailing course, as far as may be, without increasing her distance above that of a direct course distance, she will have arrived in the westerly winds, which will run her into the Cape so as to insure fetching, though a south-easter should catch her; and this in about fifteen days, perhaps, with a saving of one or two days' coal, which are valuable to contend with any unforeseen difficulties which might occur; for instance, they might enable her to steam in against a north-wester. Then, suppose a similar vessel to make the eastern passage, and to complete her coaling at Fernando Po; she will not arrive at this place till six days at least after another may have reached the northern limit of the S.E. trade; she will then require six days to complete her coal. She will not then reach the Cape, husbanding her coal as she may, under twenty days, for which she must have eighteen days' fuel. If she stop anywhere to obtain the four days' above her ordinary quantity, it will occupy fully eight days; if not, eight days will not be more than enough to allow for completing the passage under sail.

10. FROM THE EQUATOR TOWARDS THE CAPE OF GOOD HOPE.

By Captain Maury.

The following remarks on the voyage down the South Atlantic towards and around the Cape of Good Hope are from the 8th Edition of Captain Maury's Sailing Directions, and are a portion of his discussion of the best routes from lat. 0° to long. 0°.

In the eye of commerce and navigation, the North and South Atlantic present themselves in very different aspects. The waters of the former are ploughed by almost every ship in the world; the great thoroughfares in it lie crosswise; they run from side to side, as between Europe and America; and the argosies of commerce ply back and forth on the business of trade, in this sea, like a weaver's shuttle.

On the other hand, Africa is wild, South America is without ships, and there is very little business between them, and consequently less coming and going between the opposite shores of the South than of the North Atlantic. The thoroughfares on it are not crosswise, but rather lengthwise, in this sea.

Now, the best place for entering this sea is the same for all vessels, whether from Europe or the United States, and whether they be bound to South America or around either of the great southern capes.

If a chain were stretched along the Equator so that no vessel could pass between the meridian of 20° W. and Africa, navigation, at least as far as India and China, Australia, California, Brasil, and Pacific traders are concerned, would not be incommoded in the least, either on the outward or the inward voyage.

It is to the West of 25° W. that vessels from Europe have been advised to cross the line. This brings the great route for trans-equatorial voyages both from Europe and America into one through the South Atlantic; consequently, the sailing directions from the line to Cape Horn are the same, whether the vessel be from Europe or America; and so, also, are they the same from the line as far as the offings of Good Hope for all vessels, whether from Europe or America, that are bound anywhere between Australia and the Straits of Sunda.

Therefore, before discussing any other route through the South Atlantic, it will be well to take a general view of the routes through that ocean, especially for the benefit of those navigators who are bound to or around the Cape of Good Hope.

Navigators coming from Europe think it out of the way when they are advised to cross the line on the American side. They say, admit that, on account of the winds, you can from the Lizard reach the line in 30° W. as soon as you can in 20° W., yet from 20° W. on the line to the fairway of Good Hope the distance is 400 miles less than it is from 30° W. on the line.

The distance from the Lizard *via* lat. 0°, long. 30° W. to the fairway of the Cape of Good Hope, is 6,600 miles; whereas along the usual route *via* lat. 0°, and 20° W., it is only 6,000 miles. This difference, many maintain, cannot be made up by the winds. Let us see. The tables of time and crossings from the Lizard to the line show that the western route and a crossing on the American side, as West of 26° may be called, do give the shortest passages to the line.

In another page will be found a table of crossing "from latitude 0° to longitude 0°," which table serves as a guide that far for all vessels bound to or beyond the Cape of Good Hope. In that table the vessels that cross the Equator East of 26° are separated from those that cross it West of that meridian, and it appears that those which cross the Equator on the American side, i.e. West of 26°, do, notwithstanding the increased distance, actually make on the average shorter passages to the fairway of Good Hope than those do which cross East of 26° W.

From the line down through the S.E. trades of the Atlantic to the prime meridian, the tables published at Utrecht give the time and crossings of 424 Dutch vessels. Of these, 55 crossed the Equator to the West of its point of intersection with the meridian of 26° W.; and the rest (369), to the East of that meridian. To the line the average time of crossing appears, by the Dutch logs, to be—East of 26°, 33·4 days in 22° 15′, and West of 26°, 32·3 days in 29° 34′. Again confirming what the charts have suggested in favour of a more westerly crossing.

From these tables and the Dutch we derive the following statement as to the average passage from lat. 0° to long. 0°, on the route to India, of those vessels that cross the Equator West, and of those vessels that cross it East of its intersection with the meridian of 26° W.

From latitude 0° to longitude 0°, along the route through the trades of the South Atlantic to the Cape of Good Hope and Ports beyond.

Months.	Crossings E. of 26° on the Equator.					
	Dutch Vessels.			American Vessels.		
	Lat. 0°.	Long. 0°.	Days.	Days.	Lat. 0°.	Long. 0°.
	Long.	*Lat.*			*Long.*	*Lat.*
January	22°·7 W.	37°·2 S.	25·5	23·8	23°·9 W.	36°·4 S.
February	21	37	25·7	25·8	21·8	37·4
March	21·7	37	27·4	28·0	22·6	38·1
April	23·7	36·2	25·4	26·7	21·2	36·5
May	23·7	36·2	26·3	27·2	21·2	35·7
June	24·2	36	24·8	25·0	22·5	35
July	21·7	36·5	25·0	22·2	23·6	35·6
August	20·5	36·2	24·5	24·2	22·4	35·8
September	21·7	36·5	24·0	22·1	22·3	37·5
October	25·7	37	21·8	25·1	21·7	39·6
November	23·7	37·5	22·8	23·4	23·7	37·2
December	22·7	37	23·8	23·0	24·5	39·5
Mean	22·7	36·8	24·8	24·7	22·6	37

Months.	Crossings W. of 26° on the Equator.					
	American Vessels.			Dutch Vessels.		
	Days.	Lat. 0°.	Long. 0°.	Days.	Lat. 0°.	Long. 0°.
January	24·7	29°·7 W.	38°·8 S.			
February	25·3	28·3	37·3			
March	25·4	27·7	38·7			
April	24·6	28·1	36·7			
May	27·2	28·9	37·7			
June	25·5	28·7	36·4			
July	23·7	28·7	37·2			
August	25·8	28·3	41·3			
September	23·6	28·9	38·4			
October	22·3	29·4	39·2			
November	22·2	21·4	39·3			
December	24·5	29·3	37·9			
Mean	24·6	29·0	38·2	24·9	29·9	36·9

These times and crossings are derived from the means of 310 American and 424 Dutch ships. The agreement between them, as to time, is remarkable.

The mean crossings of each fleet East of 26° are so nearly at the same place that they enable us to judge as to the average sailing qualities of the Dutch and American vessels on their *outward* voyage around the Cape of Good Hope. From the place of their eastern crossing of latitude 0° to their crossing of longitude 0° in the South Atlantic, the distance, in round numbers, is 2,500 miles, and the time 24·6 days by the American, and 24·7 by the Dutch—a difference so small that it may be considered merely accidental, and not as owing to any difference, as to sailing qualities, between the two classes of ships. The tracks therefore may be considered as identical, both as to route, time, and distance. The average distance "*made* good" along this part of the main eastern track is about 105 miles a day, both by Dutch and Americans.

It is of great consequence to know the relative sailing qualities of the vessels that, under different flags, are co-operating with us, especially of those whose logs, like the Dutch, English, and French, may be subjected to a separate and independent discussion.

From the western crossing the difference of time is a little more marked—the distance from the crossing on the Equator to the prime meridian being, by the Dutch track, about 2,700 miles, by the American track, 175 miles farther—the Americans making the run in about seven hours less time.

If the average rate of sailing—viz., 105 miles good per day—from the eastern crossing be assumed as the average rate for vessels that cross West also, we may rightly infer that from the western crossing the American vessels really gain during the run to the prime meridian about two days' sail—viz., they go 175 miles farther in less time than the Dutch, and at the end of that time they are really in a better position for continuing the voyage, *for the farther South you cross the prime meridian the better*—i.e. the parallel of 38° S. intersects it at a better crossing place than the parallel of 37° does; and for all vessels bound to Australia, China, or India, the best crossing of longitude 0° is about 40° S., and rather to the South than to the North of that parallel.

Seeing, then, that we cannot ascribe the difference of two days to the sailing qualities of the vessels—Dutch and American on the *outward* voyage—to what shall we ascribe it? Clearly we may set it down as being due to difference of winds. Owing to the winds, the distance actually sailed from the eastern crossing to the prime meridian is quite as great, if not greater, than that from the western crossings. This will appear obvious by the inspection either of the track charts of the South Atlantic, or of the time tables from latitude 0° to longitude 0°.

It will be observed that the outward tracks of those Indian-bound vessels which cross the line about 25° make, through the S.E. trades, a sort of curve, of which the centre is situated somewhere on the continent of Africa, thus indicating that the S.E. trades have more southing in them on the eastern than on the western side of the Atlantic.

The mean crossing on the Equator by the vessels that go East of 26° is in 22° 40′ W., and of those that go West it is in longitude 29° 28′. The mean crossing of 20° S. by the former is in 29°, or 6° 20′ to the West of their crossing at the Equator, while for the latter it is only 2° 14′. Consequently, a vessel that crosses the Equator at the mean place East of 26°, has to make thence to 20° S. a course of South 17° W., whereas one that crosses the

Equator at the mean crossing West has to make to 20° S. a course of South 7° W. only, as per following table :—

CROSSINGS.

Months.	East, between Long. 26° and 20° on the Equator.					
	Dutch Vessels.			American Vessels.		
	Equator.	20° S.	Longitude.	Equator.	20° S.	Longitude.
	°	°	°	° ′	° ′	° ′
January	22¾ W.	30¼ W.	6½ W.	23 56 W.	28 47 W.	4 51 W.
February	23¾	30¼	6½	21 48	29 50	8 2
March	22½	29¾	7½	22 38	28 29	5 51
April	22¼	30½	8¼	21 13	27 20	6 7
May	23¾	31½	7¾	21 11	29 0	7 49
June	24¼	32¼	8	22 29	29 38	7 9
July	23¾	32¼	8¼	23 34	29 27	5 53
August	24¼	30¾	6½	22 26	30 7	7 41
September	23¼	29	5¾	22 16	29 52	7 36
October	24½	29	4½	21 41	27 31	5 50
November	25¾	29	3¼	23 46	28 12	4 26
December	24½	28¾	4¼	24 32	28 4	3 32
Mean	23 50	30 16	6 26	22 38	28 51	6 14

Months.	West of 26° on the Equator.					
	American Vessels.			Dutch Vessels.		
	Equator.	20° S.	Longitude.	Equator.	20° S.	Longitude.
	° ′	° ′	° ′	° ′	° ′	° ′
January	29 40 W.	30 59 W.	1 19	......	......	......
February	28 20	30 59	2 39	......	......	......
March	27 42	30 6	2 24	......	......	......
April	28 9	33 7	4 58	......	......	......
May	28 56	33 14	4 18	......	......	......
June	28 42	33 55	5 13	......	......	......
July	28 42	34 0	5 18	......	......	......
August	29 17	33 20	4 3	......	......	......
September	28 59	31 53	2 54	......	......	......
October	29 24	30 57	1 33	......	......	......
November	31 23	27 55	3 28	......	......	......
December	29 18	30 2	0 44	29 54	32 24	2 30
Mean	29 3	31 42	2 39	29 54	32 24	2 30

We have still further evidence going to show that the winds on the Brasil side have more easting in them than those on the African side of the Atlantic. Attention was called to this fact in the earlier editions of this work. It has an important bearing in favour of the western crossing.

The Dutch crossings are in their sailing directions arranged in two divisions; one group giving the tracks of all that crossed the line West of 20°, and the other all those that crossed it East of 20°. We have still further divided those of the first group into crossings East and crossings West of 26°, as per foregoing table. Let us now see what is the average course which vessels make to reach 20° S. after crossing the Equator East of 20°; what after crossing the Equator between 20° and 26°; and what after crossing it West of 26°; and also what is the prevailing course of the S.E. trades along the route from these several crossings of the line to 20° S.

The Dutch tables contain the means of 75 vessels that crossed East of 20°. Their mean place of crossing was for the Equator, in long 18° 3′ W. (?); and for 20° S. in long. 26° 40′. Consequently, from the Equator to 20° S. the vessels that take this route make "good" no better than a course of S. 23° W. Treating the other crossings in the same way, it appears that the mean direction of the S.E. trade wind between lat. 0° and 20° S. is for those vessels that cross in 18° W., S.E.; for those that cross it in 22°, S.E. ½ E.; and for those that cross in 30°, S.E. by E. ½ E.

This is a curious but well-established fact about the trades of the South Atlantic. It shows conclusively that an India-bound vessel is in a better position when she is crossing the line in 30° W. than she is when crossing it in 20°, and that she can reach her port about two days sooner from the western than she can from the eastern crossing.

11. CAPE OF GOOD HOPE TO ENGLAND.

The general directions given to ships, on leaving the Cape for England, are as follow:—

Having rounded the Cape, a direct course for St. Helena is nearly N. by W. ¾ W. by compass (*N.W. ¼ W.*), 1,700 miles: but prudence requires a course at first N.W. by N., until such a distance from the land is gained as to obviate all risk from squalls at N.W. and W.N.W., which, at times, are experienced near the coast. A direct course, N.N.W., will then be fair for the island.

With a strong wind, veering to E.S.E., allowance for a leeward current should be made, particularly in cloudy weather, and when the longitude is uncertain. In this case, make the latitude of the island several leagues to the eastward of it. Then proceed to haul around the N.E. or Sugar-loaf Point for the anchorage, as shown hereafter.

On quitting St. Helena, a direct course for Ascension may be taken. This is N.W. by N. ¾ N. by compass (*N.W. ¼ W.*), distance 700 miles. In this part a steady S.E. trade generally prevails throughout the year, and generally a westerly current. Ascension may be passed on either side, but the more common practice is to pass it on the West, at from 10 or 12 to 30 or 35 miles. From Ascension steer to cross the Equator, on the best meridian, according to the time of year, as previously explained, and thence proceed as shown in our North Atlantic Memoir.

Captain Maury has also devoted much labour to the discussion of this route, and the following is the result of his enquiries :—

12. FROM THE OFFINGS OF THE CAPE OF GOOD HOPE HOME.

After having doubled the Cape, and crossed the parallel of 30° S. in the Atlantic we come to a fork in the track of homeward-bound Indiamen. Arriving at this fork in the road, the European fleet bears to the right, and crosses the Equator at a mean near long. 21° 25′. The American fleet keeps to the left, and has its average crossing of the Equator near the meridian of 33° 30′ W. Such are the mean crossing places of the two fleets. To reach the line the American fleet has to run by an air line about 500 miles further than the Dutch; but it has the advantage of half a knot an hour in average speed, which reduces the difference in time to the line to a day and a half. It will be recollected that the American fleet from the Straits of Sunda, sailing on the same water and with the same winds down the Indian Ocean, beats the American fleet from Calcutta by 12 miles a day, and the Dutch fleet from Batavia and the Straits of Bali by 20 miles a day on the average. The two American fleets sail over the same ground after reaching the offings of the Cape. Consequently, their joint average, considering the number of sail in each, should exceed the average miles "made good" by the Dutch fleet in the Atlantic by 16 or 17 miles a day over the same water and with the same winds.

I shall discuss the homeward route from the fairway of Good Hope, both to Europe and America, in this Chapter; and, as preliminary thereto, offer a series of tables of crossings from long. 0° to the line, and thence to 30° N., which were compiled by Lieutenants Guthrie, Young, and Forrest.

From the tables which were drawn up we may deduce the following comparative statement of the average monthly runs of American and Dutch vessels through the trade winds of the Atlantic.

Months.	From 30° S. to the Line.					
	American.			Dutch.		
	From 30° S.	Days.	To Line.	From 30° S.	Days.	To Line.
	°		°	°		°
January	10 E.	21.8	32.8 W.	11¼ E.	20.7	21 W.
February	8.8	22.1	33.2	11¼	20.5	20½
March............	9.8	21.4	33.5	10¾	20.	20¾
April	10.0	22.4	31.9	11¼	20.1	20¾
May..............	10.6	22.2	34.3	11½	20.9	21¼
June	11.1	20.7	34.2	11½	19.8	21¼
July	10.7	21.4	34.	11½	20.4	21¼
August	10.8	22.4	32.8	11¼	20.1	20¾
September	10.2	20.8	34.2	11½	19.1	20¾
October	10.8	22.6	34.9	11¼	18.1	20½
November	9.3	19.6	33.2	11½	19.7	20¾
December	9.2	21.1	33.	11	19.4	20¾
Means.	10.1	21.5	33.5	11.3	20	21.4

Months.	From the Line to 30° N. and to Port.					
	American.			Dutch.		
	Days.	From 30° N.	To Port	Days.	From 30° N.	To Port.
		°	*Days.*		°	*Days.*
January	17.9	68 W.	29.2	20.6	37½	41.4
February	19	65.6	30.2	18.5	38	42.6
March............	17	67	25.7	18.4	38¾	41
April	18	67	24	20.1	38	41.4
May..............	17.6	66.6	23.7	20.9	38¼	41.6
June	17.8	63.7	26	20.5	38¾	41.8
July	19	66.7	28.5	19.1	38	41.7
August	23.2	64.5	32.9	18.6	35¾	41.2
September	22.8	64.6	33.8	19.5	34¾	42
October	20	65.7	28.8	20.4	35¼	41
November	21.6	68.9	32.4	19.8	34¼	38.6
December	18.8	68.1	32	19.5	35¼	35.2
Means........	19.3	66.4	28.9	19.7	36.9	40.8

	Days.		*Miles.*	*Per Day.*
American—From 30° S. and 10°.1 E. to Line in 33°.5	21.5	Distance	360	= 142
Dutch - From 30° S. and 11°.3 E. to Line in 21°.9	20	Distance	2,600	= 130
American—From 0° and 33°.5 to 30° N. and 66°.4 W.	19.3	Distance	2,620	= 137
Dutch—From 0° and 21°.4 to 30° N. and 36°.9 W.	19.7	Distance	2,030	= 103
American—From 30° N. and 66°.4 W. to New York	9.5	Distance	730	= 77
Dutch - From 30° N. and 36°.9 W. to Lizard..........................	21.1	Distance	1,830	= 87

Referring to this table it appears that the average difference of speed through the S.E. trades of the Atlantic, instead of being about three-quarters of a knot an hour in favour of the American fleet, as according to the estimate it should be, is only one-half a knot. It was three-quarters of a knot and more over the same route and through the same winds in the Indian Ocean; but in the South Atlantic the two fleets have separated, and the Dutch have the wind a little more quartering.

From this circumstance we are entitled to infer that in that portion of the South Atlantic which lies between the forks of the road made by the homeward bound Dutch and American East Indiamen, there is no appreciable difference in the average strength of the S.E. trades.

However this may be as to the *average* strength of the whole belt, it appears that the average strength of the winds between 15° and 10° S. is at a maximum along the American and at a minimum along the European track, for the Dutch crossings may be taken fairly to represent the homeward track of all European Indiamen. Between 10° and 15° S. the American average speed is 149 miles, the Dutch 122 miles a day. The mean of a still greater number will probably reduce the difference by increasing the Dutch average somewhat, which, between these parallels, is only 122 miles, if it do not decrease the American average, which is 149 miles a day. It would, therefore, perhaps be more correct to say that the band of freshest winds in the South Atlantic lies between the parallels of 5° and 15° for the American and between 10° and the Equator for the European route.

SECTION III.

DESCRIPTION OF THE ISLANDS AND SHOALS OF THE SOUTH ATLANTIC OCEAN.

1.—SHOALS, ETC., IN THE VICINITY OF THE EQUATOR.

Having given, in our North Atlantic Memoir, a particular detail of all the known dangers to the northward of the Line, it is not requisite to give a repetition of such as are there described.

VOLCANIC REGION.—In the neighbourhood of the Equator, between long. 18° and 21° W., there appears to be a tract which has been very fertile in the production of vigias, and although the American Exploring Expedition under Captain Charles Wilkes disproved the existence of any dangers in that vicinity that have been described, still the concurring testimony of so many navigators, as to dangers being seen, and even soundings obtained, is such that we must be compelled to believe that they are not without some foundation.

By comparing the following statements, it will be seen that they all refer to a comparatively limited space; and if, as is not improbable, the earlier statements are to the *eastward* of the true positions, it will reduce the extent in which they have been met with to still narrower limits. The volcanic agency which appears to be so active in this spot in the middle of the ocean has very likely caused the elevation of shoals, which have subsided, and left no trace of their existence.

It is known that when earthquakes are felt at sea, they produce upon vessels an exactly similar effect to striking on a rock or running aground. Thus, in that which took place on the coast of Chile, in 1835, and which extended over a space of more than 15° North and South, and 10° East and West, the vessels under sail or at anchor felt the shocks as if they rubbed against rocks; and that which took place at Odessa on the 9th of February, 1838, presented precisely the same circumstances.

It would be interesting to learn what is the depth of the ocean at this part, for although it would be a great chance that, in trying for soundings, any of the submarine heads or peaks, which we may infer do exist, would be touched upon, still the enormous upheaving force that would be necessary to raise a mountain from a great depth would lead us to suppose that the general depth is not more than might be attained. Although in the experiments of Sir Edward Belcher, before stated, he was unsuccessful in finding the bottom with the enormous length of 3,065 fathoms of line, at 450 miles eastward, in long. 10° 37′ W., lat. 0° 24′ N., yet at a greater distance from the African coast, in lat. 4° 14½′ S., long. 9° 37½′ W., he struck the bottom in 1,615 fathoms; this is about 550 miles E.S.E. from the region under consideration. H.M.S. *Hydra* obtained a sounding of 1,600 fathoms, in about 16° W., and H.M.S. *Cyclops* another of 1,780 fathoms, in about 20° W., nearly on the Equator.

We subjoin the various notices that we have be able to collect on this subject, which will prove interesting to the navigator, as it refers to that part of the Equator which is generally traversed; and although no danger is to be apprehended from those that have been seen, still it will be a service in throwing a light on any unusual occurrence that may be met with in this vicinity.

First, then, on the authority of M. D'Après:—

"On the 5th of February, 1754, the people on board the ship *Le Silhouette*, commanded by M. Pintault, felt a shock, or violent agitation, as if the vessel had touched upon a shoal: it was then about 5 p.m., and from the latitude taken by that very day's observation, this dangerous spot should be 20' to the southward of the Line, in about 20° 50' W. longitude, according to their reckoning, which they traced upon the French chart, from the Road of Praya, in the Isle of St. Iago.

"On the 13th of April, 1758, the frigate *La Fidèle*, M. Le Houx commander, felt also the like shocks in lat. 20' S., and long. 18° 0' W.

"On the 3rd of May, 1761, *Le Vaillant*. Captain Bouvet, about 1 p.m., saw a *small sandy island*, which bore N. by E. The latitude by the reckoning at noon was about 23' S., and their longitude, reckoned by the sight of Ferro Island, which they made on the 8th of April, was about 19° 10' W.

"On the 17th of October, 1747, the ship *Le Prince*, Capt. Bobriant, in her passage to India, felt one or two shocks, as if she had struck upon a shelf. She was at that time in lat. 1° 35' S., and about long. 17° 15' W., reckoned from the sight they had of the Isle of Prava."

Some breakers were seen, in 1730, in lat. 2° N., and long. 22° 15', according to M. Rochette. They were known as *Cæsar Breakers*.

A shoal, 3 leagues in circumference, and even with the water's edge, is stated to have been seen by several French East India ships, and placed by the French hydrographers in lat. 4° 15' N., long. 19° 20'. The Spanish chart stated it to have been seen in 1796, and an English chart exhibited it in lat. 4° 5' N., and long. 20° 35'.

October 3rd, 1771, *La Pacifique* frigate, Capt. Bonfils, in a voyage from the Cote d'Or to St. Domingo, felt at 8 p.m. a shock or extraordinary trembling, similar to that which is felt on a vessel's grounding, or rather like that of a launch. They put back immediately, and sounded, but without finding bottom. They were in lat. 0° 42' S., long., by reckoning, 22° 47' W. The sea was greatly agitated—*M. Daussy*.

Another danger is indicated as follows, by the voyage of Commodore (afterwards Admiral) Krusenstern:—

On the 19th of May, 1806, at 5^h in the evening, "we saw, in lat. 2° 43' S., long. 20° 35' W., in the direction of N.N.W., and at the distance of about 12 or 15 miles, a singular phenomenon; but which, owing to the lateness of the day, we were unable to examine sufficiently close to ascertain the nature of it. A cloud of smoke arose to about the height of a ship's mast, disappeared suddenly, then arose again, and vanished entirely. It could not be a waterspout, nor a ship on fire, as some persons on board conceived, for the smoke rose much too high: and Dr. Horner was of opinion that, if the whole was not an ocular deception, occasioned by a peculiar refraction of the rays of light, it had all the appearance of a volcanic eruption, and was, possibly, the forerunner of an island."

We have not the least doubt of its being a volcanic eruption. Its true longitude is probably 20° 44'.

In lat. 5° 4' 23" N., long. 21° 25' 40" W., the *Warley*, E.I.S., passed a shoal on May 7th, 1813. They had no time to sound, but supposed that there was about *seven fathoms on it: the bottom was distinctly seen*, and consisted of ridges of rocks, with sand between them. It was of small extent, not exceeding a quarter of a cable in length.

Although not in this precise neighbourhood, the following, perhaps, is in connection with it:—On the 1st of May, 1824, indications of a volcanic eruption were seen in about 7° N. and 21° 50' W. These were a hissing and bubbling up of the waves, resembling the ebullition of boiling water, and whitened with foam.—*Lieutenant Evans.*

Captain Proudfoot, in the ship *Triton*, from Calcutta to Gibraltar, passed over a shoal on the 18th of December, 1816, in lat. 0° 32′ S., long. 17° 37′ W., by mean of two chronometers, adjusted at St. Helena to Captain Horsburgh's longitude. [This, corrected, will be about 17° 46′.] It appeared to extend in an East and West direction, 3 miles; and in a North and South direction, 1 mile. *Sounded in 23 fathoms, brown sand;* saw no appearance of breakers.

According to a report made by Mr. Fraser, of the ship *St. George*, that a *reef, with high breakers*, had been seen in the night of the 14th of October, 1830, in lat. 6° 35′ S., long. 12° 57′ W., a diligent search for it was made by H.M.S. *Dryad*, accompanied by her tender, on the 14th of January, 1832. On the following day the *Dryad* was upon the exact spot, the tender bearing N.W. 4 or 5 miles, the day very fine and clear, a 5 or 6 knot breeze by the wind, and sufficient swell to break upon a shoal; nothing, however, indicating the existence of such a shoal could be found. For particulars, see the *Nautical Magazine*, December, 1832, p. 561.

On the 12th of April, 1831, the *Aquila*, of Scarboro', Captain John Taylor, was in lat. 0° 22′ 15″ S., long. 21° 6′ 30″ W., light winds and fine pleasant weather. At 40^{m} p.m., the water being very smooth, and the ship going at the rate of 5 knots, a loud rumbling noise was heard under her bottom, and a sensation felt, exactly like that of a vessel sliding over a rock; the rudder was so much agitated that the man who was steering could scarcely hold the wheel. No difference could be observed in the colour of the water, nor the smallest rippling. The captain concluded, at first, that it must have been a rock; but after arriving in London, there was not, on examination, the least sign of any rub on the copper; and it was concluded that there must have been, in the spot above mentioned, a volcanic eruption, the shock of which did not exceed 15″. The situation of the *Aquila* was very near that of the *Silhouette*, in 1754.

November, 1832, the ship *La Seine*, Captain Le Marié, being in lat. 0° 22′ S., long. 21° 15′ W., and going from 4 to 5 knots, felt at 11 p.m. a shock so violent that he thought they had struck on a bank.—*M. Daussy.*

On the 9th of February, 1835, the barque *Crown*, of Liverpool, after crossing the Equator with a pleasant breeze at E.S.E., and running at the rate of 6½ knots, at 10^{h} 30^{m} p.m. touched the ground and grated for a short time with the keel, as if passing over a coral reef; so soon as clear, the boat was lowered down, but no bottom was found at 120 fathoms deep. The latitude of the spot was 57′ S., and the mean longitude, by chronometers and lunars, 23° 19′ W. For further particulars, see the *Nautical Magazine*, October, 1835, p. 577.

From the Journal of Captain Jayer, commander of the *Philantrope*, of Bordeaux.—"On the 28th of January, 1836, at 9^{h} in the evening, being in about lat. 0° 40′ S., and long. 20° 10′ W., we felt an earthquake, which made the vessel shake during three minutes, as if she were scraping along a bank, and to such a degree that I was certain she was aground." And again he says, "From the 13th to the 16th of March, fine weather, we were in sight of an American vessel, the *St. Paul*, of Salem, going to Manilla. This vessel, which we had seen under the Line, had felt the same earthquake which we had experienced, and at the same time, being 10 miles West of us."—*M. Daussy.*

In the number for November, 1836, of the Transactions of the Asiatic Society of Bengal, is the following extract from the proceedings of the Society of Calcutta:—"Mr. T. L. Huntly presents some volcanic ashes, collected at sea by Capt. Ferguson, of the ship *Henry Tanner*. These ashes were black, and had the same consistence as those of coal. The spot where they were picked up was 0° 35′ S. and 15° 50′ W.; the sea being in a violent agitation." In a former voyage made by the same officer, and almost in the same place, lat. 1° 35′ S., long. 20° 27′ W., they had been greatly alarmed by hearing a very great noise. The captain and officers thought that the ship had struck on a coral rock; but, in sounding, they could not reach the bottom.

Captain Sprowle, of the *Circassian*, is stated to have seen a sand bank under water, but just visible in the hollow of the sea, in lat. 1° S., long. 19° W., which makes it in the direct track of vessels homeward bound from St. Helena, &c. Horsburgh makes no mention in his Directory of any bank having been seen here, and it is more than probable that vessels have sailed immediately over it. No discoloured water has, that we are aware of, ever been seen here; and if it were not for the difference of 2° of longitude between this supposed bank and that of Vigia, it might be concluded that it must have been the latter. As there can, however, be but little doubt, if the latitude and longitude be given correct, that such a bank does exist, it is highly important that the government should take some steps in this important matter, and that captains of vessels bound for the East Indies should endeavour to corroborate it for the safety of all mariners.—*Times*, January 14th, 1841.

The following, perhaps overdrawn statement, appeared in the newspapers of February, 1853. "An extraordinary marine convulsion was experienced by the *Maries*, on her passage to Caldera. On the morning of the 13th of October, the ship being 12 miles from the Equator, in long. 19° W., a rumbling noise appeared to issue from the ocean, which gradually increased in sound till the uproar became deafening; the sea rose in mountainous waves, the wind blowing from all quarters, the control over the ship was lost, and she pitched and rose frightfully, all on board expecting each moment to be their last. This continued 15 minutes; the water then gradually subsided, when several vessels in sight at the commencement of the convulsion were found to have disappeared. Shortly after a quantity of wreck, a part of a screw steamer, was passed, so that some vessels and lives were lost."

Another occurrence is as follows:—Ship *Ann Mary*, of Liverpool, Mr. Rackham, commander, on a voyage from Liverpool towards Bombay, commencing 1st January, 1842. "Made Ferro, January 19th; 22nd, passed the position assigned to *Maria's Shoal*, water a little discoloured. Passed to the eastward of Cape Verde Islands, strong and steady trades. February 5th, light breezes, smooth water, fine weather; at 5 a.m. was aroused from sleep by a violent shaking of the vessel, and a loud rumbling noise. My first idea was that the vessel was on one of the dangers hereabouts, the next that we had been struck by lightning, and that the masts were all tumbling down; by this time I was on deck, looked over the side, the vessel going through the water, but shaking as if she would fall to pieces, so that the man at the helm could not hold it. All hands were now on deck, and panicstruck at this awful earthquake; it lasted nearly a minute; $5^h\ 50^m$ a slighter shock; $9^h\ 45^m$ a fainter; and near noon one scarcely perceptible. At noon observed in lat. 0° 44′ S., and chronometer brought down 20° 16′ W., from 5 a.m. made a S.W. course 26 miles. It is probable that this submarine ebullition may have left some danger.*

Another notice of these eruptions is as follows:—

Ship *Sarah Bell*, J. R. Bell, commander, from Port Philip to Liverpool.—In lat. 1° 7′ S., long. 21° 21′ W., on the 3rd of July, 1842, at 4 a.m., we experienced a very heavy shock of an earthquake, which at first alarmed us very much, as we thought the ship was grinding over a bank or shoal; but the continuous steady noise and agitation of the vessel soon convinced us of the cause; as had it been a shoal, from the sea there was running at the time, the vessel must have been wrecked; as it was, she never lost any way, but continued going at the same rate as before. The noise

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[*] It would appear that this was but the commencement of a series of subterranean commotions, which terminated in the destruction of Hayti.—Ed. *Nautical Magazine*.

and sensation (as if a heavy chain cable were running out) continued about four minutes.—*Nautical Magazine*, 1842, page 646.

On the 17th July (1852 ?) Capt. J. H. C. Short, when in command of a large ship, bound to the East Indies, met with a very singular phenomenon, which will extend the area of this submarine fire action.

"Being in lat. 3° 30′ S., long. 24° 30′ W., sudden trembling of the ship was felt. I was on the lower deck at the time. The mate, who was on deck, called loudly to me, saying, the ship is striking on rocks, for such it appeared to be. I immediately ran on deck, and ordered the helm down. Although there was a nice light breeze, the ship would not answer her helm. I looked over the side, the water around us appeared to be agitated, as if boiling, and a short distance from us was a vapour ascending as if from a furnace. All hands witnessed this extraordinary sight. We got the long lead-line along, and payed to 110 fathoms, but no bottom was found. The lead and line were very warm when hauled in."—*Nautical Magazine*, 1853, page 381.

Captain Ballaird, of the ship *Rambler*, from Calcutta, on October 30th, 1850, in lat. 16° 30′ N., long. 54° 30′ W., and Capt. Potter, of the bark *Millwood*, last from Rio, half an hour later on the same day, when in lat. 23° 30′ N., long. 58° W., each felt a volcanic shock. These vessels were about 520 miles apart. Supposing them to be in direct line, in which the earthquake was travelling, its rate will appear to be about 1 mile in 5 seconds, which is only a little slower than sound travels through the air.

The U.S. sloop *Vandalia*, December 15th, 1849, near midnight, in lat. 17° 34′ N., long. 55° 49′, experienced the shock of an earthquake, which lasted 5 seconds, and was accompanied by a low rumbling noise, and strong vibration throughout the ship. The wind, which was N.E., immediately veered to East, and decreased.

The Russian ship *Dallais*, W. Wikander, commander, March 20th, 1861, at 7 p.m., lat. 0° 27′ N., long. 20° 30′ W., the ship apparently went over the ground; the ship's masts and yards were shaken. Found afterwards that the false keel had gone.

At the same moment another ship, the *Melbourne*, of Dundee, C. Cowie, master, in lat. 0° 20′ N., long. 20° 35′ W. (that is 8½ miles distant from the Russian ship, in company), was startled by hearing a loud rumbling noise, and at the same time felt the ship tremble from stem to stern, which lasted 4 or 5 minutes.

The ship *Florence Nightingale*, Captain Gales, January 25th, 1859, having the St. Paul Rock, or Penedo de San Pedro, bearing N.W. by N. 10 miles, experienced a severe shock. It commenced with a rumbling noise like distant thunder, and lasted about 40 seconds. The sea had been short and irregular, but was succeeded by a heavy swell from N.E., which lasted for several days.

The ship *Alma*, Capt. Gilkison, March 11th, 1855, at 6.30 p.m., lat. 0° 57′ S., long. 18° 10′ W., heard a sound as of thunder, with a tremulous motion as if the vessel were grating over a reef, lasting about 2 minutes. On sounding no bottom was obtained with 120 fathoms. The water was quite calm and still. At 0.30 a.m., on the 12th, another shock was experienced.

In about lat. 1° 4′ S., long. 21° 52′ W., on March 26th, 1861, at 10 a.m., Captain Tate, of the *Madge Wildfire*, felt an earthquake shock, with a noise like distant thunder, and as if the ship were dragging her anchors in a strong tide-way.

In lat. 1° 18′ S., long. 19° 48′ W., on September 6th, 1869, at 2.30 a.m., Captain Tully, of the *Baroda*, felt a shock, lasting 20 or 30 seconds, with a violent trembling of the ship, but with no unusual appearance in the sea.

Capt. Whitmore, of the *Sea Serpent*, December 29th, 1859, struck, as he supposed, on a coral reef, in lat. 0° 29′ N., long. 28° 30′ W., in consequence of which he put into Rio. He sounded immediately, and found no bottom, but found afterwards his false keel and copper injured.

The Russian sloop of war, *Passodnik*, struck, as was supposed, on the same shoal, about 24 hours before the *Sea Serpent*, but this proves the nature of the occurrence to be volcanic.

The *Prince*, of Scilly, James Thomas, commander, December 11th, 1853, in lat. 0° 54′ N., long. 26° 50′ W., smooth water, suddenly felt a grinding tremour go through the vessel, as if dragging over something rough and yielding. It continued for about a ship's length, but did not stop her way through the water. The ship did not strike.

The ship, *Maid of Judah*, felt a slight shock, September 15th, 1855, lat. 1° 30′ N., long. 25½° W. Strong swell from the southward.

The bark *Eleanor*, Captain G. A. Findlay, March 25th, 1861, 10 a.m., felt a shock as if something very heavy was being rolled about the decks, or as if the ship had gone over some rough ground; it made the vessel tremble only for a few seconds. A rumbling noise heard like distant heavy thunder. Weather remarkably fine; lat. 0° 44′ N., long. 21° 19′ W. Great quantities of fish and sharks around the ship.

The *Don Quixote*, from Calcutta, June 10th, 1871, lat. 12° 20′ S., long. 14° 14′ W., experienced quite a heavy seaquake, causing the ship to tremble violently. The motion appeared from East to West, lasting several seconds. Fifteen minutes after had another shock, not quite so violent as the first, but lasting longer. The sensation was as though the ship was moving over a rough bottom; wind at the time moderate, from S.E. by E. For some days previously had the wind very unsteady, going from point to point very suddenly. The day following the shocks the sea was very much agitated, a heavy roll from West and S.W., seemingly much more than any wind would create in that vicinity.

These instances, with the others, will afford ample evidence of the general nature and locality of these volcanic shocks.

We have limited the instances here to this particular area on the Equator; but there appears to be either an extension of this action far to the northward, or else there is a separate area, for volcanic shocks have been felt as far North as 23° 30′ N., and long. 58° 0′ W., and from the almost continuous line of discoloured and peculiar water that extends from the Equator to this position, we are led to infer that there is a line of volcanic action trending parallel to the range of the Antilles.

It being desirable that the reports respecting the existence of some of the foregoing islands should be set at rest, the American Expedition, under Capt. Charles Wilkes, explored this region, and from his letter we give the following extracts:—

" We succeeded in crossing the Equator in long. 17° W., on the 5th of November, 1838, and then stood for the *Triton's Bank*, said to be in lat. 0° 32′ S., long. 17° 46′ W. When within a short distance of its position, the squadron hove-to for the purpose of ascertaining our position accurately, after which a course was steered nearly West. Being at the time well to the eastward, we ran on a line due East and West over it, the vessels of the squadron being spread about 3 miles apart, on a line North and South. We did not, however, find it in our progress, or any bottom, or indication of soundings; no *discolouration* of water was visible, or change of temperature, although the line extended 30 miles East and West of its reported position; after which we stood again to the North, and ran over a *vigia*, as laid down on the charts, but none such was found in existence.

" Our next examination was for *Bouvet's Sandy Island*, which was, in like manner, carefully searched after, in and around its position, as laid down on the charts; but our search was equally unsuccessful.

" Finally, search was made in and about lat. 2° 43′ S., long. 20° 35′ W. Extending to the N.N.W. of this point a distance of 30 miles hereabout, having been assigned as the situation of the submarine volcano reported by Admiral Krusenstern, which was supposed might have left a shoal. This locality was twice run over in different directions, and carefully examined, with the squadron in open order, but none such was found in existence.

"Lieutenant Hudson, of the *Peacock*, having separated from me on the 16th of October, proceeded on a different course, in search of the same shoals which we were looking for; but was equally unsuccessful in finding any, as appears from the following extract from his report to me, which affords further evidence, if it were needed, of their non-existence.

"After disproving the existence of *Warley's Shoal* and *French Shoal*, he proceeds to say, 'I then made the best of my way for the *Triton Bank*, with the wind hauling and veering from S.S.W. to S.S.E., and passed the Equator on the night of the 3rd of November, in long. 17° 40′ W., and continued over and around the locality of that bank until the morning of the 5th; getting casts of the lead, during the time, in from 50 to 250 fathoms, up and down, without finding bottom. I have in my search fully satisfied myself, and hope our examination will prove equally so to you and all others, that these shoals do not exist.'"

By order of the British Admiralty, Capt. Wickham, in the *Beagle*, also tried for soundings, on crossing the Equator, but did not succeed, with 190 fathoms, in two places; one in 0° 55′ S., and in 22° 52′ W., and the other in the same latitude, in 23° 23′ W., the vessel's course being due West between them.*

Although the fact of the present existence of shoals, &c., before-mentioned, be disproved by the result of the American Expedition, still the undeviating testimony of so many navigators to this one particular space, as being subject to volcanic eruptions, will certainly give very great weight to the testimony of their having been seen: and, at the same time, renders it very probable that similar discoveries may occur again.

We cannot conclude our notices on this subject without again recommending this singular region to the observation and attention of the navigator.

2. ST. PAUL'S ROCKS, OR PENEDO DE SAN PEDRO.

This cluster of five or six craggy, steep rocky islets without verdure, whitened with birds' dung, is about half a mile in circumference, and the highest pinnacle, about 65 ft. above the sea, lies in lat. 0° 55′ 45″ N., long. 29° 21′ W., a position well ascertained, as it is the mean between those observed by Captain FitzRoy, in 1832, and Sir James Ross, in 1839, and therefore well adapted as a point to correct longitudes or rate chronometers.

The appearance annexed has been communicated by the master of a merchant ship.

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* These unsuccessful soundings will prove but little, as they were to the westward of the tract in question.—Ed.

The rocks change materially in appearance, according to their bearing. The *Tellicherry* passed in sight in 1802, and found that their appearance between N. 30° W. and N. 37° W., 6 or 7 miles distant, was that of a heap of rugged rocks, with low gaps between some of them. The northernmost, a small pyramidal rock rather lower than the rest.

Penedo de St. Pedro, West, 6 miles, as taken by Captain Monteath.

They are surrounded by deep water, there being no bottom at 50 fathoms 150 yards off their East side, and a depth of 25 fathoms is found at 1 cable from the S.W. rock, but there is a sunken rock about 100 yards from their southern end. The Equatorial Current here sets to the W.N.W. usually at from 1 to 2 miles an hour.

Commodore Brou, in the French frigate *Hermione*, in 1825, describes Peñedo de San Pedro as a mile in extent, in a N.E. and S.W. direction; seen in fine weather 12 to 15 miles off; when bearing N.W. appearing in the form of three pinnacles of sharp naked rocks of a remarkable shape. The S.W. pinnacle separated a short distance from the others. The latter appears safe to approach, and no breakers were seen to indicate sunken rocks. The *Hermione* sailed round on the eastern side, at the distance of 5 miles; did not try for soundings; but from the colour of the water it was presumed that bottom would not be found.

The Equatorial Current set the ship to the westward at the mean rate of 18 miles, and to the North 6 miles in the 24 hours, between the parallel of 8° N. and the Equator, and the meridians of 28° and 30° W. At the islets the direction of the current changed and set more to the northward at three-quarters of a mile in the hour.

A copious description of these isles is given by Capt. Amasa Delano, who, in the American ship *Perseverance*, from Boston toward Cape Horn, 23rd December, 1799, at 2 p.m., saw three small islands bearing W. by S. 6 to 9 miles distant. The vessel bore away, and at 3 p.m. was abreast of them. Hoisted the small boat out, went on shore, and found them to be nothing more than a cluster of craggy rocks, about one-fourth of a mile in extent from North to South, and nearly as much from East to West. No sort of vegetation existed upon them. The rocks were found to be five in number, but only two of considerable magnitude. Their greatest extent was from N.N.E. to S.S.W. The two largest nearly connect with each other and form a kind of harbour, or place of shelter for a boat, on the N.W. side. Here they managed to land, but obtained nothing excepting a number of boobies. On shore the aspect was most dreary, the sea roaring and surging on all sides. Two smaller rocks were lying off to the S.S.W. of the large ones, and one, very small, to the N.E. When on the highest part, which was 100 (65) ft. above the surface of the sea, no dangers could be seen but what showed themselves above water, nor could any be discovered from the ship. Plenty of fish were caught in the harbour or basin. At 6 p.m. returned on board. Sharks were numerous about the ship; but in attempting to take them, a number of hooks and lines were lost, and several pairs of grains broken. On sounding, within 2 miles of the islets, no ground could be found with a line of 200 fathoms.

Capt. Delano states that the islets may be seen at the distance of 12 miles, and always make like three sail when first seen. They are very dangerous if fallen in with by night. The current near them sets N.W. by N., true, 1 mile an hour. The parts above the reach of the surf are covered with birds' dung. The birds were hatching their young at the time. The month of November would be the season for procuring eggs at this place, as they may be obtained at that time in abundance; but, being the eggs of oceanic birds, they are rather fishy than sweet.

Capt. FitzRoy, from his observations, places the summit of the Peñedo in lat. 0° 55′ 50″ N., long. 29° 22′. Temperature of the air and water, 82°. Wind S.E. The rocks were seen on the horizon at sunset of the 15th. They appeared extremely small at about 8 miles distant. At daylight next morning two boats were sent to land upon and examine them, while the *Beagle* sailed round, sounding and taking angles. Good observations were made during the day, as the sky was clear, and the water smooth.

The multitude of birds which covered the rocks was astonishing, and they suffered themselves to be kicked about and killed with sticks; at the same time, those on the wing even darkened the sky. While one party were scrambling over the rocks, a determined struggle was going on in the water, between the boats' crews and the sharks. Numbers of fine fish, like the groupars (or garoupas) of the Bermuda Islands, bit eagerly at baited hooks, put overboard by the men; but, so soon as a fish was caught, a rush of voracious sharks was made at him, and notwithstanding blows of oars and boat-hooks, the ravenous monsters could not be deterred from seizing and taking away more than half the fish that were hooked.

At short intervals the men beat the water with their oars, all round the boats, in order to drive away the sharks; and for a few minutes afterwards the groupars swarmed about the baited hooks, and were caught as fast as the lines could be hauled up; then another rush of sharks drove them away; those just caught were snatched off the hooks; and again the men were obliged to beat the water. When the boats returned, they were deeply laden with birds and fish, both welcome to those who had been living on salted provisions.

From the highest point of the rocks, which is 64 ft. above the sea, no discoloured water, nor any breaking of the sea, could be discerned, apart from the place itself; and from the soundings taken in boats, as well as on board ship, I conclude that it is unconnected with any shoal, being merely the summit of a steep-sided mountain rising from the bottom of the ocean. A slight current was setting to the westward, not amounting to a mile an hour.

They were also visited by Sir James Ross, with the *Erebus* and *Terror*, in his Antarctic expedition, November 28th, 1839. He has given a small chart of them, and the following:—"We found the steep north-eastern side of the cove the most practicable point for landing, and near it we obtained our observations. These remarkable rocks, which lie in lat. 0° 56′ N., long. 29° 20′ W., and more than 500 miles distant from any continent, appear to have been raised by volcanic agency, and not in any part exceeding 70 ft. above its surface, and present the form of an oblong crater, the larger axis lying in a N.E. and S.W. direction." Mr. M'Cormick, the talented surgeon and naturalist to the expedition, gives also the following remarks:—"They consist of a group of rocks scarcely exceeding half a mile in circumference. The four largest form a kind of bay on the N.W. side, in which there is considerable swell. The highest rock is on the N.E. side of the bay, rather sharply peaked, 70 ft. above the sea. The next in height, and the most remarkable, from its uniform white colour, is 61 ft., and is on the S.W. or opposite side. This rock is a very hard kind of hornstone, covered with a thin layer of calcareous matter, evidently formed by the excrement of the birds."

H.M.S. *Challenger* visited these islets on August 27, 1873, and made fast by a hawser to the point on the N.E. side of a small cove formed by two islets on the N.E side of the group. Sir C. Wyville Thomson says:—"We were greatly struck with their small size, for although we knew their dimensions perfectly well—rather under a quarter of a mile from end to end of the group—we had scarcely realised so mere a speck out in mid-ocean, so far from all other land."

The following description is taken from the official report of Captain Nares, in command of H.M.S. *Challenger*:—Deep water, from 500 to 1,350 fathoms at 4 miles distance, was found round the island, which, with the part above water being rock composed of minerals allied to serpentine, points to its volcanic origin. During our stay the current was constantly running to the W.N.W., the water banking up and accumulating against the weather side of the islets, rushed past each end at the rate of at least 3 knots an hour, causing a confused sea, and eddy tide race under the lee of the land. Our boats were unable to pull against it on trying to get to windward of the islets.

The rocks are a cluster of islets grouped in the form of a horse-shoe, open to the N.W., having three prominent guano-topped peaks or hillocks, with off-lying smaller islets or rocks above water on the North and South sides; the whole occupies a space of 2½ cables N.E. and S.W., and 1½ cable broad. The highest peak is on the N.E. or middle islet, and, as given by FitzRoy, is 60 ft. high. The North and S.W. islets have also each their peaks, of some 5 or 6 feet less elevation.

The only outlying danger discovered was a rock half a cable distant West of the southern end; the least water found on it was 5 fathoms, but there may be less. With this exception the West shore of the S.W. islet, which is readily distinguished by the most southerly, and whitest, hillock of the group, is steep-to, and if it were not for the constant swell a ship might be lashed alongside of it. Off the West side of the most northern of the three islands, forming the North side of the bay, the rocks, with about 2 fathoms water on them, shelve off into deep water at 20 yards distance from the shore; it cannot, therefore, be approached quite so closely. At 100 yards distance there is a depth of 104 fathoms.

The small bay or opening between the N.W. and S.W. islets is 170 ft. across at the entrance, and about 100 yards deep, with from 10 to 5 fathoms of water. Constant rollers, produced by the south-easterly swell recurving round the points, enter the bay, and, meeting the continuous streams which enter from the south-eastward as each wave breaks on the weather shore and pours its volumes of water through the chasms separating the islets, produces a confused sea. In reasonably fine weather a landing can always be obtained immediately inside either point of the bay, but with a derrick or light bridge thrown across the rocks there would be no difficulty in keeping up communication in the worst weather that could be expected in these latitudes. The landing would be most troublesome with a north-westerly wind, as the south-easterly swell must be continuous.

As regards the establishment of a lighthouse on these dangerous rocks, there is an excellent site, requiring very little preparation, on the S.W. islet, 10 ft. above high water mark, consisting of a flat surface, 40 ft. by 100 ft., conveniently placed. With a derrick, the immediate landing would be easy during the northern summer. Any of the present small rocky hillocks, rising from an uncertain rocky base, would require considerable work to reduce them down the necessary 20 or 30 ft. before a base of sufficient size for a foundation would be given; if this were undertaken, an additional elevation of 20 or 30 feet would be gained, but the expense would not compare favourably with the work.

Fresh water is not procurable; during the calm season rain probably falls in sufficient quantities, but the clouds of spray produced by the constant beating of the sea against the weather shore would make the water brackish. Excellent fish are to be obtained in great abundance, and during the season the supply of sea birds' eggs would be unlimited.

There is no anchorage ground off the island during the S.E. trade wind; however, a ship will ride easily and securely with hawsers secured one on each side of the entrance of the bay.

Sandré Rock (?)—A danger, which certainly must be placed among the doubtful, has been announced to the South of the Peñedo. It is necessary to give it, though the statement does not carry much conviction with it. "On December 30th, 1849, at 7 p.m., the ship *François Casimir*, Captain Sandré, being in lat. 0° 14′ S., long. 29° 18′ W., perceived, at a cable's length off, on the port hand, a large black mass. The moon had not risen, and it was not certain whether this mass was a rock or a ship, but the commander doubted that it was a vessel, because up to sunset he had a man at the look-out, who saw no signs of such on the horizon. On the morrow they made the Peñedo, and found that the current had set them to the North."—*Annales Hydrographiques, Tome* III, *p.* 343.

3. FERNANDO NORONHA.

Fernando Noronha has been well placed on the charts for many years. Capt. Cook, 1775, and Capt. Foster, 1830, gave a near approximation to the position since more accurately determined by Admiral FitzRoy and Lieut. Lee, U.S.N. The former place Fort Conçeiçao, on the West side of Water Bay, in lat. 3° 50′ S. Capt. Foster makes it 3° 49′ 59″ S. The longitude, according to Admiral FitzRoy, is 32° 25′ W.; Lieut. Lee makes it 32° 24′ 48″ W., measuring from Pernambuco (Fort Picao, long. 34° 51′ 48″).

The island itself is about 4½ miles long N.E. by E. and S.W. by W., and 1½ mile in breadth. To the eastward of it are several other smaller islets, the outermost of which is Wooding or Rat Island, 1 mile long, separated by a narrow channel from Boobie's Island, and this again by a shallow passage from St. Michael's Mount, Vana or Egg Island, and the Platform, all of which lie around the N.E. point of Fernando Noronha. To the N.W. of this and of the island is Cloven or Split Rock, and at nearly 1 mile from the N.E. point is *Water Bay*, at the head of which is the town. Fort Conçeiçao is on the West side of the bay, and the citadel on the other.

The Pyramid, or Peak, is a rugged, barren pinnacle, 1,000 ft. high, which in some directions looks like a steeple. On its N.E. side are some horizontal basaltic columns. From this peak Placellière, or the S.W. point, is 3 miles distant, and at nearly 1 mile westward of the peak are two small islets, called the *Twins*. A *sunken rock*, with 15 fathoms inside it, lies at a quarter of a mile off the extremity of the S.W. point, which is a narrow peninsula, having at its commencement a hole through the rock, called the Hole in the Wall, which being very conspicuous in some positions, is a useful mark. Two other rocks lie S. by W. from the S.W. point, at a half and three-quarters of a mile distant, with 30 fathoms between them. At 2 miles from the S.W. point, on the South side of the island, is a small bay protected by two small islands, Mayor Island and Goelette or Statue Island, from its resemblance to a statue. Tobacco or South Point is about half a mile to the S.E., and has a reef of rocks awash stretching off it a third of a mile to the southward. The remainder of the South coast is very irregular, and on the East side of the bay, to the East of Tobacco Point, is the highest hill on the island. At three-quarters of a mile off the East Point are two small islets called the Brothers.

A rocky patch, apparently the only outlying danger, lies at 1¾ mile S.E. of Tobacco Point, with 9 to 15 fathoms between. The sea always breaks on it, and when on it the Pyramid is shut in by the highest hill, on the South side.

On approaching the island no soundings will be found till very close in. There is no danger but what may be seen, excepting the rocky spot 1¾ mile off the S.E. point, and the rocks off the S.W. point. H.M.S. *Challenger* sounded in 820 fathoms at about 6½ miles westward of the island, and in 1,010 fathoms at about 6 miles northward of it.

The road or principal anchorage is on the North side of the island, being sheltered by the north-eastern land, and several islets in that direction. The anchorage has from 10 to 12 fathoms, loose sandy ground, at about half a mile from the citadel point, or nearest shore. It is unsafe to lie in with northerly or N.W. winds, which are said to prevail from December to April; in the other months the winds are mostly from the S.E. or easterly, sometimes at N.E.

Water may be obtained here; but, in the dry season, it is sometimes very scarce. In seasons of drought, which are not uncommon, the rivulets are dried up, and the vegetation parched. There are but few vegetables, but plenty of live stock and fish, with an immense quantity of doves. The fresh water is obtained from a well near the Governor's house, in the cove called *Water Bay;* but the casks must be rolled over some rocks, and swung off to the boat, over the impending surf.

Wood is cut on the larger islet to the N.E., called *Wooding* or *Rat Island*. This islet is nearly surrounded by rocks, and there is a risk of staving the boat when taking off the wood, as it is heavy, and sinks if thrown into the water.

Should the governor permit wood to be cut on the main island, it may be conveyed without much danger from the fine sandy bays to the westward of the road.

On the 9th of April, 1827, H.M.S. *Cambridge*, Capt. T. J. Mailing, touched here, and there were at that time about 200 inhabitants upon the island: of these sixty were soldiers, under the government of a Prussian officer, who, with the assistance of an engineer, was repairing the fortifications, and erecting new points of defence. She anchored with Rat Island bearing N.E. by E. ½ E., St. Michael's Mount, partly shut in by the Platform, E. ½ N., and the citadel S.S.E. 1 mile, the Sugar-loaf Hill S.S.W., and two small islands S.W. by W.

The current here commonly sets strongly to the westward, for which due allowance must be made in rounding the islands on the N.E.

Fernando Noronha was copiously described by Mr. Webster. The large island, he says, is still used by the Brasilians as a place of transportation for criminals, as well as for the exile of political delinquents. The beautiful scenery of this island is enchanting. The shore is scooped out by inlets, and embossed with green promontories, which are connected by circling beaches, where rippling waves chase each other over the silvery sands, and bathe the flowerets of the skirting woods. A fresh luxuriant verdure crowns the summits of the hills, blending its soft hue with the general contour of the island. A richness and variety of vegetation is seen everywhere, excepting on the colossal pyramid of naked rock, which, rising from the bosom of a grove, stands erect in barren ruggedness, towering majestically over the smiling and fruitful scenes around. It is a gigantic block, the summit being 800 (1,000) ft. above the level of the sea, and is an excellent mark for seamen.

The scenery throughout is all fertility and beauty. There are no romantic hills and dales, but everything is on a moderate scale, and pleasing to the eye. The vegetation is that of a thickly-wooded grove, rather than that of the dense forest, for it admits of a walk even through its most shaded parts. There is an inland lake in the island, and one or two trifling brooks, but no permanent streams of any importance. In the wet seasons the island is one continued swamp and bog; while in the summer it is dry and arid, and occasionally altogether deficient of water.

The island is garrisoned by a small party of Brasilian soldiers, under the command of a major, who fills the office of governor. He has a few staff officers, and about 100 men. The islands are protected by several forts, which, if in good condition and well manned, would present a formidable means of defence.

A small village is seated on the shore of Peak Bay, built in the form of a square. The houses composing it are not worthy of note, but are sufficient for the place: a neat chapel stands on the hill over the village, which also boasts of a clean and comfortable hospital, and a respectable and commodious house for the governor. The other principal buildings consist of a set of barracks for the soldiers, a tank or large cistern for water, a bath, and a prison in which the culprits are lodged every night, after being allowed the liberty of ranging about the island by day. Most of the houses have gardens attached to them, and the governor has a farm at a short distance from the village, from whence his table is supplied.

At about 3 miles from the village, in a S.E. direction toward Tobacco Bay, are extensive fields of Indian corn and cotton, besides a plantation of cocoa-nuts and a tolerable garden. A brick and tile manufactory is also carried on there, but there are no lime-kilns.

Admiral FitzRoy visited this island in 1832: he says—"Before sunset, on the 19th of February, we saw the Island of Fernando Noronha, with its singular peak towering aloft, and at midnight anchored in the roadstead.

"Next morning I landed with difficulty, for observations, the surf being so high that any common boat would have been swamped. By taking great care, our broad and well-built whale-boats landed the instruments and a small party, and re-embarked them afterwards, without accident.

"We landed in a small bay under the so-called citadel; but there is a safer and in every way preferable landing-place about a mile to the northward. Most of the inhabitants of the island had changed their dwellings frequently, being all exiled convicts from Brasil. The governor was a major in the Brasilian service, born at Pernambuco, and under his command were 200 black troops, and about 800 human beings, only 30 of whom were women, and a very few children.

"We obtained some firewood from some of the islets northward of the principal island; but it was full of centipedes and other noxious insects, from which it was not easy to free it, even by charring and washing; water we did not try to get, because of the heavy surf, but there is no scarcity of it on the island. Neither live stock nor vegetables could be procured from the apathetic inhabitants.

"This place is rather picturesque; and the lofty barren peak, already mentioned, is conspicuous from every point of view. Near the summit is a station, from which a look-out is kept, not only over all the island, but over many leagues of the surrounding sea; so that neither ship nor boat can approach or depart, during daylight, without being noticed.

"No boats are allowed to be kept on the island, and no intercourse is held with shipping without permission, and the strictest inspection."

The following extracts are taken from a paper in the Journal of the Royal Geographical Society, vol. xlii., 1872, page 431, by Alexander Rattray, Esq., M.D., R.N., who visited these islands in H.M.S. *Bristol*, in August, 1871:—

"Fernando Noronha is about 4 miles long, and on an average 1 mile broad; it consists chiefly of an undulating plateau from 100 to 300 ft. above the sea-level, sloping steeply towards sandy beaches or bays, or ending in bold bluffs or cliffs, but rising occasionally into what the inhabitants jocularly term 'mountains,' of which there are four or five, from 500 to 700 ft. high; at the eastern end lie five or six small islets, chiefly rocky, and almost unused. The general trend of the whole is about S.E. and N.W.

"The anchorage off the convict village, about the eastern third of the north-eastern side of the island, is open and easy of access; and large ships may anchor close to the Fort Rock and the narrow sandy beach on which landing is usually effected.

"The convict village, termed the 'city,' is built principally on the slope rising steeply from the landing-place, and numbers about 1,000 inhabitants. The chief part is a square, so-called, formed by the governor's residence, a small church, the prison, workshop, and government stores; all stone-built whitewashed buildings.

" Commanding the village and anchorage, and built on the summit of a high rock, jutting well into the sea at one end of the landing-place, is the principal and only respectable fort. Formerly there were eight forts in different parts of the island, but now there are only four, with 32 guns in all, many old and rusty. Only one fort is used. At the further end of the bay rises the singular-looking peak, a needle-shaped, bald, inaccessible elevation, which towers 1,014 ft. into the air, and casts a long shadow on the adjacent slope, so as to form an admirable sun-dial.

" The island is held by 150 soldiers and 6 officers, under a governor. The soldiers, who guard the stores, though not specially the convicts, occupy the fort. The convicts are 1,500 in number, chiefly Brasilians, negroes and half-castes, with a few Italians, a half-caste American and an Englishman. Sixty of the number are women. There are about 200 women in all, including female convicts and the wives and daughters of soldiers and male prisoners. Children raise the total island population to about 2,000.

" The surface rock of the group is a conglomerate of reddish clay—enclosing boulders of basalt, and occasionally penetrated by huge masses of basalt and granite, which form the peak and other hills, headlands, cliffs, and rocks. There are no known minerals. The deep, reddish, clayey soil, parched and cracked during the dry season, but, like the roads, soft and muddy during the rainy season, is highly fertile. Almost the entire island is under cultivation.

" The chief vegetable productions are maize, manioc, beans, and castor-oil, which are grown in alternate rows of maize and manioc, or maize and beans, or manioc and castor-oil plant.

" There are about 160 or 170 horses and 500 cows on the island, belonging chiefly to the sergeants. Milk is abundant, and usually bought by the convicts. Cattle are occasionally killed for the soldiers. Except pigs and dogs, no other larger quadrupeds exist than rats and mice, both common in the fields. Fowls are plentiful. Our sportsmen bagged many small doves, but suffered from a troublesome stinging-nettle, and from the effects of a tree whose leaf or stem sap caused much pain and swelling in the part on which it accidentally dropped. Lizards and wasps abound in the fields, and also a black burrowing cricket (*gryllus*). The water-birds are—wideawakes, gannets, tern boobies, noddies, boatswain birds, &c. Fish are abundant, large, and good.

" Though tropical, the climate is essentially fine and healthy, as shown by the appearance of the inhabitants.

" The scenery, especially of some of the bays, is by no means unpicturesque. On the whole the island is well worth a visit, and would especially repay the curiosity of the naturalist."

At the time of the visit of H.M.S. *Challenger*, in September, 1873, much the same state of things prevailed as described by Mr. Rattray; the island, unfortunately, was not explored, the governor being unable to grant the necessary permission.

The climate of these isles has been described in page 57. For the phenomenon called the *Rollers*, which occasionally prevails here, see p. 138.

4. THE ROCAS.

This low coral reef is perhaps the most formidable danger in the Atlantic. It is the only one of its character in that ocean—a true atoll, isolated from all surrounding lands, so many of which are found in the Pacific. It is, moreover, more redoubtable from its lying in the midst of strong, and at times of devious, currents, in what, under Captain Maury's advice, has become a great highway across the Equator.

Lighthouse.—The Brasilian Government is erecting an iron lighthouse on this reef, and pending its completion a *fixed bright* light, visible 9 miles, is shown from a mast 49 ft. high, on the North island of the reef, about 1 mile from its N.W. edge.

It is necessary to allude to a singular error in its position, which has been perpetuated nearly till the present time, and which must have led to much embarrassment, and probably loss and danger. Yet the apathy of the seaman is exemplified in this, that among the thousands who must have passed it, and suspected the error, not one should have thought it worth while to question the accuracy.

This very dangerous group was examined, and their position accurately ascertained, by M. Lartigue, under the Baron Roussin, in 1825. Yet from an erroneous estimate in Horsburgh's Directory, the *first* edition, in 1809, they are placed in longitude 33° 31′ W., or from *fifteen to eighteen miles too far East.* This error was continued in all the editions of Horsburgh down to that of 1855, and has doubtless misled many. It was first pointed out by Lieutenant Lee, U.S.N., who visited it in the U.S.S. *Dolphin*, in April, 1852. The position finally assigned to the reef is very nearly as in the table, page 3, and note 2, page 7.

Lieutenant Lee's longitude connected with Fernando Noronha, with a four day's interval, would make the North end of Sand Island in long. 33° 49′ 14″ W., lat. 3° 50′ 56″ S. Captain Parish places the centre of Grass Island in lat. 3° 51′ 25″, long. 33° 46′ 33″. Captain Selwyn says it is 3° 51′ 30″ S., long. 33° 50′ 9″ W. The mean of these last is 33° 48′ 39″, which agrees nearly with Lartigue, and may be taken as very near the truth, considering that Bahia and Pernambuco are settled as in the table on p. 11, and notes 2, 3, p. 15.

The Rocas have been the scene of many sad wrecks. A fleet of Indiamen and others had a narrow escape in November, 1805, when the *Britannia* and *King George* were wrecked. Several occurred subsequently, of which no particulars are known, beyond the existence of the remains which were found on them by later wrecked and other visitors. In October, 1855, the *Countess of Zetland* was lost here. In October, 1856, the *E. D.* was wrecked, a portion of the crew escaping after much suffering. On October 7th, 1865, a fine ship, the *Duncan Dunbar*, was totally lost on it. (It is singular that all these wrecks should have occurred at the same time of the year.) This last disaster was the subject of a judicial investigation at home, which exonerated Captain Swanson, her commander. Much controversy subsequently arose.

The *Currents* in the vicinity of the Rocas are very powerful. It lies in the strength of the great southern branch of the Equatorial Current, described on pages 119—121, which sets strongly to the *westward*, but certainly not invariably in that direction, and with a very changeable rate. It is stated to run westward 1½ knot per hour, 36 miles per day. Undoubtedly this velocity is frequently attained, but it is very much less than this as a mean. In the months of September and October it is about 16.5 miles a day. From a mean of about fifty observations in their immediate vicinity throughout the year, it is about 19.8 miles per day. But this rate is in varied directions. It frequently ceases altogether, or is almost inappreciable. It is found running to the South and S.E. as well as to the northward, and Admiral Roussin mentions a special case of his own experience, when he was drifted 350 miles to the *eastward*, in what is usually considered to be the strength of the Equatorial Current, at a few degrees to the eastward on the same parallel.

Under these circumstances, it behoves every commander to be specially on his guard when in their neighbourhood, especially by night, for then the only visible sign of its existence will be the breakers on its edges.

We will give extracts from the descriptions in the order in which it has been visited.

Lieutenant Lee, who surveyed it in April, 1852, gives the following description of it :—

The centre of this low and dangerous reef is in lat. 3° 51′ 27″ S., long. 33° 48′ 57″, and is 84 miles due West of the Peak of Fernando Noronha. The reef extends about 1¼ mile in latitude, and nearly 1¾ mile in longitude, and is covered at high water, with the exception of Grass and Sand Islands on the West, and the scattered rocks on the South and East sides. These objects are from 10 to 15 ft. above the reef, which is formed of coral, generally level, though with many holes in it. In case of a vessel striking on the weather side of it (S.E.), the chance of saving life would be but small. When about 10 miles off, the breakers were first seen from aloft. Then the two low islands and the black rock soon appear. Sea birds abound, but there is no guano owing to the rains. The eggs of the gulls are plentiful and good (March, 1851). There is no wood nor fresh water. There is bad anchorage from 1 or 2 miles N.W. of Sand Island, in from 15 to 18 fathoms, coral bottom. We found coral bottom at 16 fathoms 6 miles East of the reef, but no bottom at 30 fathoms 2½ miles N.N.E., nor at 70 fathoms 4 miles S.E. of it.

The tide rises about 5 ft. The lagoon, in which we saw many turtle, has from 1 to 4 ft. water at low tide, and shows white from the mast head at 4 or 5 miles distance. The anchors and cable on the S.W. part of the reef, and the remains of a wrecked vessel on the N.E. side of Grass Island, appear to have been on the reef for a long time. A lighthouse on the reef would be very useful to vessels.

The *current* in the vicinity of this reef sets from between S.E. by E., and E. by N., at the rate of from ⅞ to 1½ mile per hour, as found by the patent log. The surface current found by trials on four different days, sets from between S.E. and E. by N., from ⅞ to 1⅜ mile per hour. At the anchorage under the lee of Sandy Island, the tide ran from ¼ to ⅞ knot per hour, setting from between S.S.E. and E. by N. towards the northward and westward.

Lieut. Lee saw the remains of many wrecks on various parts of the banks, and a hut on the western edge; numerous cotton bales lay scattered about. A bank, carrying 14 or 15 fathoms, affords anchorage as far as 5 miles to the

N.E. of the banks. Lieut. Lee planted some cocoa-nut trees on the eastern sand-bank, which would afford a useful mark if they grow.

Commander Parish next visited it. The following is his report:—

"On the 5th of March, 1856, I sighted the Rocas from the mast-head at 4^h 15^m p.m., bearing W.N.W., about 9 miles distant, at which time we had no bottom with 46 fathoms. I then bore up N.W. to close the group, and on sounding at 5^h p.m. obtained coral bottom in 13 fathoms, the rocks not being even then in sight from the deck. I therefore determined on remaining in that position during the night, and consequently anchored in 12 fathoms, the highest rock being then first visible from the deck, bearing West (*true*).

"At 6^h 40^m a.m. the next day I proceeded under steam to the N.W., giving the shore a berth of about 5 miles, until arriving on the N.W. side of the sand-banks, where I anchored in 20 fathoms, coral bottom, at about 2½ miles from the shore, with the following *magnetic* bearings (variation 10° W.): breakers, southern extreme, S. 15° E.: middle of sand-banks, S. 27° E.; highest rock of group, S. 42° E.; breakers, eastern extreme, S. 50° E.

"Whilst describing the semicircle, our soundings were 13, 14, and 15 fathoms, until the group bore S. by E., when there was no bottom with 70 fathoms. From this it appears that the shoalest water exists on the eastern side. A careful attention to the deep-sea lead would alone betray to a vessel in doubt the vicinity of the shoal on approaching in that direction, when, if practicable, anchoring is a course to be strongly recommended, until daylight or clearer weather enables the master to ascertain his true position.

"As the prevailing winds in that quarter will always enable a vessel bound North to choose a course either to the East or West of this shoal, I do not see that any master would be justified in endeavouring to sight the same; a proceeding which might be attended with considerable danger, and the benefits to be derived from which I am at a loss to conceive.

"Having landed on the eastern sand-bank, I caused a number of cocoa-nut trees to be planted thereon, which were furnished me by H.M. Consul at Pernambuco, with the view of their forming, in time, distinct land-marks, which will enable the place to be discerned at a much further distance than is now possible. (Of these, only one was remaining when the *Mercurius* was wrecked here in March, 1870.)

"The highest part of the bank may be set down at about 10 ft. above high-water mark. Rise and fall of tide, 7 ft. We found the current to set W.N.W. (*true*), between 1 and 2 miles per hour."

It appears probable, from the observations of Commander Parish, that a bank of soundings extends from the Rocas in a N.E. direction to the distance of about 5 miles. Upon this bank the depth obtained was 14 and 15 fathoms. It is strongly recommended to make a frequent use of the lead when approaching the reef, and to have an anchor and cable ready for letting go, should occasion render it necessary.

Captain J. H. Selwyn, R.N., re-surveyed the island in H.M.S. *Siren*, November, 1857, and gives the following observations:—

"It is a perfect coral island, circular, about 2 miles in diameter, and has in its centre a shallow lake, with an opening to the sea. The greater part of the reef is under water. There are two sand-banks, one on the S.W. side, and the other on the N.W. side of the island. These are 10 or 12 ft. above water at all tides, and are 200 or 300 yards long. The smaller has on it some stunted vegetation and hazel trees. A tower, 33 ft. high, has been erected on the larger bank, which can be seen in good weather a distance of about 11 miles. The island lies in a strong westwardly current, varying from 1 to 2 miles an hour."

Captain H. Toynbee passed them in the *Gloriana*, in October, 1858, and published the following useful remarks in the "Nautical Magazine," October, 1859:—

"Throughout the afternoon (October 9th), we steered about S. 35° W., and at 5^h p.m. we saw the reef about 12 miles off, extending from nearly right ahead out on the weather bow; and at 6^h we kept away W.S.W., so as to pass it at the distance of about 5 miles.

"The sighting of the Rocas was one of very many instances in my experience proving the look-out man, either from want of practice or from want of feeling an interest in what he was doing, unable to see an object almost staring him in the face. From 3^h 30^m p.m. I ordered a regular look-out from the fore-topsail-yard, and at 5^h p.m. felt so sure that the reef must be in sight, that I determined to visit the topsail-yard myself; when on stepping into the rigging something strange caught my eye, which proved to be a beacon on the western part of the reef; yet from the topsail-yard the look-out man had seen nothing, and could hardly see it when I pointed it out. A similar case happened one evening on our way towards Torres Straits, when I sent an officer up to look round as the sun set, though I always kept a man on the fore-topsail-yard. He quickly saw a long line of broken water right ahead, it being part of Lihou Shoal, extending further to the eastward than it was laid down either in charts or books. I find that in moderately clear weather, when observations show that the land may be sighted, a good night-glass on the fore-castle and a patent lead are first-rate safeguards; indeed the three L's are all right enough, but much depends on the quality of these said L's.

"From the fore-topsail-yard, with a first-rate Dollond, I examined the reef carefully. It reminded me of Wreck Reef and others in Torres Straits, in the usual characteristics of a fringe of rocks sticking above water all round it, and lagoons of beautifully green water inside the fringe. There were loose pieces of rock lying in different parts, apparently thrown up by the sea, one larger than the rest on the eastern end of the reef; and on the western was the highest patch of sand; it was very white, though partly covered by something looking like brownish grass, and *there* was placed the beacon. I saw no signs of the cocoa-nut trees planted by Commander Parish, of H.M.S. *Sharpshooter*.

"From this bird's-eye view, I think that the whole reef was fringed with rocks above water, with no passage even for a boat between the patches of sand. There were large numbers of birds settling on the island, and as the evening advanced we passed several which were steering a straight course for it. This, as has frequently been remarked before, is a capital sign for pointing out land, for the booby and some other sea birds will, if possible, find a resting place for the night, even though it should be only a ship's yard-arm; when some mischievous boy is sure to disturb his dreams, of which he makes everybody in the ship aware by his loud screaming as he is carelessly carried down by the neck."

Captain Dumaresq, of the *Innisfail*, from Bahia, reports as follows:—"Oct. 9th, 1872, sighted the Rocas Reef, passed very close on the West side. Observed per bearings, in coming from the southward, that the reef is longer from East to West than reported in the Sailing Directions. It appeared at least about 3½ miles, and from North to South about 2 miles. Saw white bottom at about half a mile off the West end, but no breakers. A few trees were growing on the South islet, about 10 ft. high, and were distinguished from aloft before the hut on the northern islet could be seen about 10 miles off. I am of opinion that nothing of the reef could be seen on a fine night at a mile off, unless from the whiteness of the water on the reef and lagoon."

The following is a notice of the unfortunate loss of the *Duncan Dunbar* before mentioned:—On Oct. 7, 1865, Captain Swanson, her commander, observed her position at noon, and laid his course to pass 12 or 15 miles to eastward of the Rocas, allowing for the current as 1½ mile per hour to the westward. At 8.30 p.m. she struck on an outlying patch on the N.W. side of the isles, and became a total wreck. The ordinary westerly drift had evidently ceased, and a not unfrequent slight southerly and easterly one had taken its place, and thus caused the disaster. The passengers and crew (117 in number) escaped to the Sand Island, and were fortunately all rescued on October 17th.

"In the chart of this reef a beacon, called there the Syren Beacon, was marked as being on the bank or islet on which we landed, and 30 ft. above high-water mark, and seven cocoa-nut trees as being on the other islet or bank. This beacon is no longer in existence, having fallen, and the seven cocoa-nut trees have disappeared, there being only three very young, growing cocoa-nut trees, about 4 ft. high. It is not impossible, that at high spring tides, with a northerly or north-westerly wind, the water would rise to the level of the islet on which we took refuge, if not somewhat above it."

One of the latest disasters here, occurred on March 25th, 1870, when the *Mercurius*, commanded by Captain Cuthbertson, struck on the rocks and became a total wreck, only six of the crew out of twenty-two being saved.

Looking over the islands which were to be their home, some fifteen acres of barren rock, interspersed with patches of sand, and connected by a narrow isthmus with another rock equally barren, of the same size, met their gaze. One cocoa-nut tree formed the only sign of vegetation. They found two iron tanks deposited in convenient positions and filled with water, as well as a considerable quantity of broken timber, out of which they built themselves a log hut.

These six men spent fifty-one days on the reef, enduring great hardships, not the least of which was the pain caused by the bite of venomous ants, which swarmed on the reef. They were rescued by Captain Cohn, of the *Silver Craig*, on the 15th of May, who first noticed the hut which they had constructed, appearing as a lump on the reef.

What has been said will suffice to put the mariner on his guard when in the vicinity of this dangerous spot, which lies about 125 miles off the N.E. extremity of the Brasilian coast about Cape San Roque and Point Toiro.

"The *current* between the Rocas and the main sets generally from the southward and eastward, from 1 to 1½ knot, until near the flats, where we experienced indications of a counter current or tide. Learned at Para that their coasting vessels were generally four weeks going from there to Pernambuco. It is more from the failing of the wind than from the current that it is so difficult to double Cape San Roque."—*Lieut. Lee*, 1852.

CAPE SAN ROQUE, in lat 5° 29′ 15″ S., long. 35° 15′ 18″ W., is considered as the turning point of the Brasilian coast. It was surveyed by Lieut. Vital de Oliveira, of the Brasilian navy, in 1859, and by Capt. Mouchez, of the French navy, in 1867, and these charts give us a fair knowledge of this important landfall. The *Shoals of San Roque* extend between the Cape and Toiro or Touro Point, 23 miles to the N.N.W., at a distance of from 4 to 6 miles off shore, the outer edge being in some places awash. The N.W. point is 5 miles N.N.E. from Point Toiro, and the S.E. end 4½ miles N.E. from Cape San Roque. There are several channels through this outer line of reefs, and within it is a channel of 3½ to 5 fathoms throughout, except a *bar* of 13 to 14 ft. midway between Cape San Roque and Point Toiro. The chart will show the peculiarities of this important point, and they are described in a subsequent part of this work.

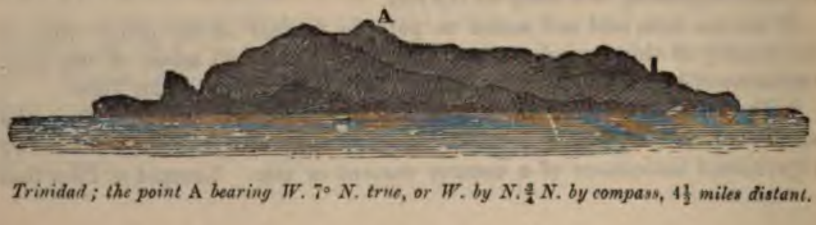
5. MANOEL LUIS SHOAL, OFF MARANHAM.

The West end of this dangerous reef lies in 0° 51′ 30″ S., long. 44° 17′ W. It had long been known to exist, but its exact situation was not ascertained until 1820, when it was found by the Baron Roussin of the French navy, who is said to have had a very narrow escape when searching for it.

The reef, which lies 0° 1′ 30″ East of the meridian of St. Luis, or Maranham, is "more than half a mile across from North to South, but not less than 3 miles in an E. by S. and W. by N. direction, and is formed by a cluster of conical rocks, whose heads are just beneath the surface of low tides, having small openings of deep water (8 to 10 and 17 fathoms) between them, which renders it the more dangerous; as in case of striking thereon, a vessel would, most probably, go down immediately." A more copious description of this shoal is given hereafter, in the Directions for Maranham, &c.

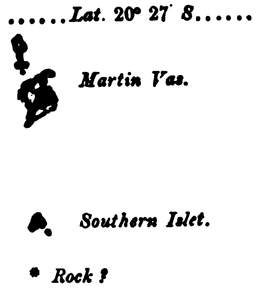
6. ISLET OF TRINIDAD, MARTIN VAS ROCKS, ETC.

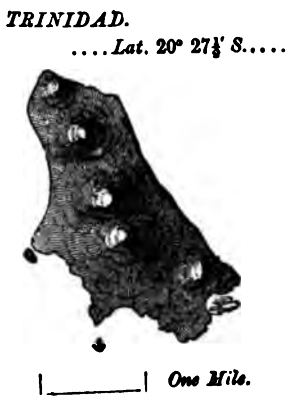
The little island of Trinidad has been correctly placed on our charts, by the survey of M. Bérard, an officer of the *La Coquille*, commanded by Captain Duperrey, in October, 1822. A copy of his survey of this and the adjoining Martin Vas Rocks is annexed. The S.E. point of Trinidad is in latitude 20° 29′ 55″ S. The longitude of the S.E. point, according to Comm. Owen, is 29° 21′ 42″ W.



Trinidad; the point A *bearing W. 7° N. true, or W. by N. ¾ N. by compass,* 4½ *miles distant.*

In approaching Trinidad from the eastward, when running on its parallel, you will make the three islets or rocks of *Martin Vas*, which may be seen at the distance of 24 to 27 miles from a ship's deck. These rocks are very remarkable, and cannot be mistaken; they lie North and South of each other, the distance from the outer rock being about 2½ miles. The central rock is very high, with tufts of withered grass scattered over its surface; the other two are entirely barren. There is a passage between the southernmost and central rocks. The northernmost almost join. In clear weather Trinidad is distinctly seen from the rocks of Martin Vas, and may be descried 48 miles off.





This island is about 6 miles in circumference, the land very unequal, and at best no more than a cluster of rocks, with some shrubs in the valleys. Its highest point, according to Captain Trollope, is 2,020 feet above the sea. The northernmost side is quite barren, but to the southward all the interstices of the rocks are filled with evergreens of several kinds; there is also a quantity of sea-fowl and rock fish, and many wild hogs.* The generality of the wood is very small, though there are trees of 18 ins. diameter toward the extreme heights.

Trinidad is surrounded by sharp rugged coral rocks, with an almost continual surge breaking on every part, which renders the landing often precarious, and watering frequently impracticable; nor is there a possibility of rendering either certain, for the surf is often incredibly great, and has been seen, during a gale at S.W., to break over a bluff which is 200 ft. high.

The island is supplied with very good water from two small streams down the East and S.W. sides of it, besides a small issue from the rock which forms the S.W. extremity; not one of them will fill a tube of 6 inches in diameter, and there is a doubt whether these runs are temporary or perennial, though they always produce a small quantity of water sufficient to preserve the existence of a few wretched inhabitants. It is now uninhabited. Lieut. Thomas Hamilton, from whose account the detail of Trinidad is chiefly extracted, speaking of the anchorage, says that they anchored off the West side of the island, at a mile from the shore, to be able to weather it on any tack should the wind happen to blow on, "being directed," continues that gentleman, "to do so by Capt. D'Auvergne, who informed us of the wreck of the *Rattlesnake* and the miraculous escape of the *Jupiter* and *Mercury*." They prudently avoided the common anchorage, which is about a musket-shot from the shore, in 18 or 20 fathoms of water. On that side there stands a stupendous arch or hole in the rock, like that of Fernando Noronha, and two very remarkable rocks, one called the Monument, and the other the Sugarloaf.

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* Captain Edmund Halley, of the *Paramore Pink*, afterwards Dr. Halley, Astronomer Royal, landed on this island 17th April, 1700, and put on it some goats and hogs for breed, as also a pair of Guinea fowl, which he carried from St. Helena. "I took (says his journal) possession of the island in His Majesty's name, as knowing it to be granted by the King's Letters Patent, leaving the Union Flag flying." When the English went to Trinidad in 1781, in order to ascertain whether a settlement was practicable there, they did not find it, after a survey of two months, to answer their expectations Commodore Johnstone planted various roots on the different heights, but they all perished in a short time for want of water.

The Monument is 850 ft. high, of a cylindrical form, and almost detached from the island, with large trees growing on its top. This had been named, in 1700, by Dr. Halley, the *Ninepin*. The Sugarloaf, at the S.E. end, is 1,160 ft. high, of a conical form, with trees likewise on its summit, and, whenever it rains hard, a cascade of above 700 ft. makes there a beautiful appearance. The Arch is a natural passage, made by the sea through a bluff about 800 ft. high; it is 40 ft. in breadth, nearly 50 ft. in height, and 420 ft. in length; the depth of water above 3 fathoms. When the sea is moderate, you may see through this arch into the only bay in the island, and have a view of a distant rock covered with trees, which renders the prospect extremely picturesque.

Lieut. Hamilton says, "We first saw the island on the 5th of June, on our passage to the Cape of Good Hope; we had then variable winds and calms; and on making it a second time, the 8th of November, we had exactly the same winds and weather, accompanied by a heavy squall of wind from the westward. During our stay there, above two months, the prevailing wind was from N.N.E.; hence I consider the S.E. trade wind is not to be depended on, although the island is so far within the Tropic of Capricorn."

The American commander Amasa Delano visited Trinidad in 1803, and he again describes it as mostly a barren rough pile of rocky mountains. What soil there is on the island he found on the eastern side, where there are several sandy beaches, above one of which the Portuguese *had* a settlement, and have, he says, done much work in making streets or roads over the valleys, levelling down small hills to make the roads good. They had walled in a number of inclosures for the purpose of making fields, at the expense of much labour. "This settlement was directly above the most northerly sand-beach on the East side of the island, and has the best stream of water on the island running through it. It might be possible (he adds), in pleasant weather, to get it off from this place, but we get ours off the South side from the next best watering place or stream. This falls in a cascade over rocks some way up the mountains, so that it can be seen from a boat when passing it. After you have discovered the stream, you can land on a point of rocks just to the westward of the watering place, and from thence may walk past it, and when a little to the eastward of the stream there is a small cove between the rocks where you may float your casks off.

"Wood may be cut on the mountain just above the first landing-place, and you can take it off if you have a small oak boat. The method in which we filled our water-casks was carrying it in kegs and buckets to the place where we floated our casks on shore.

"All the South side of the island is indented with small bays; but the whole is so iron-bound a shore, and such a swell surging against it, that it is almost impossible to land a boat without great danger of staving it. The South part is a very remarkable high, square bluff head, and is very large. There is a sand-beach to the westward of this head, but I should caution against landing on the beach till it is well examined; for just at the lower edge of the beach, and amongst the breakers, it is full of rocks, which are not seen until you are amongst them. Where we landed we saw the remains of at least two or three boats which had been knocked to pieces by landing. We found plenty of goats and hogs. The latter were very shy, but we killed some of them and a number of goats. We saw some cats; and these three sorts of quadrupeds were the only animals we saw on the island.

"If a ship is very much in want of wood or water, it may be got at Trinidad; or if the crew should have the scurvy, it is an excellent place to recruit them in, as you can get plenty of greens on the S.E. part of the island, such as fine purslain and several other kinds. These, together with the fine sweet water, would soon recruit a crew.

"A ship must never be anchored at this place with common cables, or she will be likely to lose her anchors; but if she has chains for her anchors, the rocks cannot cut them. The navigation is safe for a ship all round the island within the distance of a mile. *Martin Vas Rocks*, or more properly islets, lie about East, 27 miles distant, but there do not appear to be any dangers between them and Trinidad."

Commodore Owen, in H.M.S. *Leven*, made Trinidad on the 25th of April, 1822; and he says that Trinidad, excepting the S.E. bay, appeared like a mass of rocks. The Ninepin, on the western side of the island, appears to be a basaltic column, and it is very remarkable from a slight inclination in its position, which makes it look from certain points as if about to fall. A few stumps of euphorbia and some other shrubs were scattered over its otherwise barren surface; the vicinity of the S.E. bay alone bearing an appearance of fertility.

MARTIN VAS ROCKS.—These rocks, as before noticed, are high and barren. The central one is the largest, about 300 ft. high, and it may be seen from a ship's deck at the distance of 25 miles. When bearing South the rocks seem nearly in a line. The northern and central rocks are near each other, but between the central and southern rocks is a good channel. Here the *Chesterfield*, in 1800, observed the latitude 20° 28′. When through, she hove-to in 12 fathoms, with the largest rock E.N.E. about a mile, the bottom then visible, and caught plenty of rock cod and other fish; the boat, in sounding, found the depth decrease gradually, over a rocky bottom, to 1½ fathom close to the largest rock.

The North rock is small, and most westerly; all are steep and inaccessible. The distance between the extremes is only about 3 miles.

According to M. Bérard, whose survey is given on page 233, the largest islet is in lat. 20° 27′ 40″ S., long. 28° 52′ 38″. This position has been confirmed by Capt. H. A. Van Karnebeek, of the Netherlandish frigate *Prins Hendrik*, who makes its longitude 28° 52′ 45″ W. Hence the true bearing from Trinidad is W. 4° S. (or W. ¾ N. by compass), and the distance is 26 miles.

SUNKEN ROCK near MARTIN VAS.—In a Dutch work,* Mr. Menkman. captain of the merchant ship *de Amstel*, has given information relative to a previously unknown sunken rock, near the Martin Vas Rocks. He says it lies a short mile S.W. (N.E.?) from the rocks.

7. ABROLHOS OR BRASIL BANKS.

Between the parallels of 16° and 22° S., and between long. 30° W. and the coast, there is an extensive bank, or rather collection of banks, with deep water between them, the number and nature of which we as yet know very imperfectly. The Abrolhos Islets occupy a central position among these coralline shelves, and have been well surveyed. So also have two patches, now placed on the charts under the name of the *Victoria* and *Hotspur Banks*, from the surveys of Capt. Denham, in H.M.S. *Herald*, in 1852. But each of these had been before known and partially explored, as will be presently seen. These, then, are well determined; but of others enumerated here, the positions and extent must be left for future examination and consideration.

Commencing with the northward, the ships *Royal Charlotte*, *Brunswick*, and *Glatton*, in June, 1803, when in lat. 16° 0′ S., long. 37° 48′ W., had soundings in 22 and 25 fathoms, and thence gradually deepening from S.S.E. to S.E., 15 miles, to 60 fathoms. This may be the edge of the off-shore soundings, as the *David Scott*, in June, 1810, in lat. 16° 35′ S., long. 38° 26′ W., had from 19 to 24 fathoms, the coast in sight bearing W.S.W., distant about 51 miles.

The next portion is a patch of from 31 to 70 fathoms, coarse sand and coral, lying in about 16° 50′ S., long. 36° 10′ W., known as the *Fly Bank*. To the westward of the Fly Bank is another patch, with 28 fathoms least water. Commander Rodgers, of the U.S. ship *Adams*, 1877, describes it as having a general depth of 30 fathoms, and as being 15 miles long in an E.N.E. and W.S.W. direction, and 10 miles broad. The centre of the bank is in lat. 17° 7′ S., long. 36° 54′ W. The least water found was 28 fathoms, on the eastern edge. The East, West, and N.W. sides are steep-to, the soundings deepening suddenly to no bottom with 100 fathoms of line. The bottom is composed of red coral intermixed occasionally with moss and weed.

Airy Shoal, of 3 fathoms, in lat. 17° 9′ S., long. 36° 4′ W., on which the barque *Professor Airy* was reported to have grounded in October, 1875, was unsuccessfully searched for by H.M.S. *Opal* in April, 1876, and by the Brasilian war vessel *Araquaja* in May, 1876, both finding no indications of shoal ground. A search was also made by Commander Rodgers, in the U.S. ship *Adams*, in July, 1877, who gives it as his opinion that the shoal does not exist, and also states that it has been suggested by the Brasilian hydrographer that the *Professor Airy* grounded on the Abrolhos Bank, as the lightkeeper at Santa Barbara reported a vessel answering her description was seen to be ashore for a short time within sight of the lighthouse.

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* "Verhandeligen enz. betrekkelijk het Zeewezen en de Zeevaartkunde," door G. A. Tindal en Jacob Swart, Amsterdam, 1843.

Hotspur Bank, presently described, is 1° to the South of this. In June, 1792, the *Busbridge*, when in lat. 18° 35′ S., long. 35° 54′ W., by chronometer, and 35° 56′ by lunars, had soundings in 30, 32, and 33 fathoms, coral rock. The next to the southward is a shoal, marked on the chart, of 30 to 73 fathoms, in lat. 20° 15′ S., long. 36° 25′ W. To the West of this is the *Victoria Bank*, presently described.* In lat. 31° 56′ S., long. 38° 56′ W., some discoloured water was seen by the *Zephyr*, as shown on the chart; and at 1° West of this is the sounding obtained by H.M.S. *Pilot*, in 1843.

All these banks have more or less of one characteristic, that of having a hard coralline crust, and also of being very steep-to. The depths between them have not been ascertained, but exceed from 160 to 250 fathoms. As they might be serviceable in approaching this coast, as a means of verifying the positions, or indicating the proximity of the continent, it is much to be desired that a more complete knowledge of their extent, number, and character were recorded.

The observations of Sir George Nares, commander of H.M.S. *Alert*, 1878, led him to infer that these banks were once reefs of living coral with shallow water over them, which have subsided to their present depth; but that the subsidence was too rapid for the reef-building coral animals to keep pace therewith, and the banks are now at too great a depth for the coral to exist.

HOTSPUR BANK.—The existence of this bank, one of the number before alluded to, was first determined by a sounding of 47 fathoms in the *Hotspur*, in 1814. Capt. H. M. Denham, in command of H.M. ships *Herald* and *Torch*, on their way to the Fiji Islands, in October, 1852, examined and determined its extent. "I shaped a course that should test this single sounding of 47 fathoms; and obtaining quicker soundings as we approached the assigned position of the *Hotspur*, our casts jumped suddenly from 200 fathoms, no bottom, to 27 fathoms, coral; which, being 7 miles in advance of the 47-fathoms spot, at once gave rise to an idea that the bank might cover a considerable space with perhaps shoaler water. No time was lost in taking up an anchorage upon it. The atmosphere favoured our morning, noon, and evening observations, so that latitude and longitude were satisfactorily obtained. It blew sufficiently moderate from N.E. to detach the boats, and before the swell disturbed us we obtained sufficient to show that we had anchored upon a steep-to bank of coralline crust, extending 14 miles N.W. and S.E., and 10 miles in a N.E. and S.W. direction, with as little as 25 fathoms on the middle of it, and which deepened suddenly from 30 fathoms to 70 and 200 fathoms, without bottom. We could not detect the slightest current nor discolouration that would indicate so abrupt a feature in ocean water, by ripple or otherwise. The lead brought up a few specimens, but the dredge and anchor brought up nothing, and the fishing lines were very successful. We determined the latitude of the N.W. extreme of this bank to be 17° 51′ 30″ S., and the longitude, with the subsequent rates at Rio, 36° 5′ 9″ W., and the variation 6° 33′ W."

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* An island distinguished by the name of *Ascensao*, or *Portuguese Ascension*, has formerly been described, and said to lie at the distance of about 100 leagues to the westward of the Isle of Trinidad. Doubts were long since entertained as to its existence, and they may now be considered as verified.

A recent examination (1877) of Hotspur Bank by Comm. Rodgers, of the U.S. ship *Adams*, has shown that the bank is more extensive than was formerly supposed, its length being 22 miles in an E. by N. and W. by S. direction, and its breadth 12 miles; the depths obtained varying from 32 to 48 fathoms, coral, with a general depth of 33 fathoms. From the edge of the bank the soundings increase suddenly to no bottom with 100 fathoms of line. The N.W. extreme of the bank is in lat. 17° 50′ S., long. 36° 7′ W.

VICTORIA BANK.—For a knowledge of the extent of this bank we are also indebted to Captain Denham. Its existence was first made known by the *Montague*, in 1813. A portion of it had been sounded by Commodore Sinclair, in the U.S. frigate *Congress*, in 1817, as related in Brackenridge's account of the voyage; the depths there found were 35 fathoms, and they were lost in lat. 20° 30′ S., long. 37° 30′ W. It was therefore called the *Congress Bank*. In August, 1849, the U.S. ship *John Adams* explored its S.E. position.* Captain Denham's remarks, continued from the previous description, are as follow:—

Pursuing our search for the Montague Shoal, at 9 miles farther eastward than it was reported, we struck it in 31 fathoms, from a long line of 180, with the deep-sea lead, and no bottom. We were forty-eight hours buffeting with a south-easter before we could obtain an anchor hold of this bank, to which my attention had been specially directed. Eventually we occupied three positions on it; the *Torch* joined us, and we soon traced out a tolerably flat bank of 35 fathoms, bending to the South, in its general direction from N.W. to N.E., 72 miles in length, and 12 miles in breadth, with one spot at its N.E. extreme of only 19 fathoms. We found a current to the S.W. of three-quarters of a mile per hour. The same description of fish as on the Hotspur were found in abundance. The swabs which we let down on it from different parts of the ships entangled some massive specimens, while the crusted surface would yield nothing to the dredge or palm of the anchor. Our observations on this bank place it in lat. 20° 45′ 8″ S., long. 37° 47′ 33″ W.

The French frigate *Belle Poule*, in March, 1843, tried for soundings at 90 miles to the East of the assigned position of Congress Bank, commencing in lat. 20° 25′ S., long. 35° 49′ W., and terminating in lat. 20° 33′ S., long. 35° 58′. She found from 18 to 20 fathoms, coral bottom. Although there is thus a difference of nearly 90 miles in the longitude and that stated for Congress Bank, it is possible that they may be the same. The longitude of the *Belle Poule* may be taken as near the truth.

PILOT BANK.—H.M.S. *Pilot*, Capt. Jervis, in 1843, struck a bank of soundings in from 9 to 15, 16, and 35 fathoms, extending N.E. and S.W., from lat. 21° 38′ S., long. 39° 35′, to lat. 21° 51′, long. 39° 50′, or about 15 miles in extent. Within this there is a depth of above 160 fathoms between it and the shoal water extending off Cape San Thomé. Whether a less depth than this of 9 fathoms exists in this locality has been doubted, but depths of 5½ and 4¼ fathoms have been reported within 25 miles of the Cape. This must be left for future determination, though the uneven nature of the bottom in this vicinity would render such a fact not improbable.

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* See Captain Powell's (commanding the *John Adams*) letter respecting his soundings in the "Annales Hydrographiques," vol. iii, p. 239, and the "Nautical Magazine," 1850, p. 187.

8. THE ISLAND OF ASCENSION.

This solitary island is said to have been discovered by the Portuguese on Ascension Day, 1501, from which it takes its name. It was taken possession of by Great Britain in 1815, being then uninhabited. Lying in the track of shipping bound to the Cape, it has received much attention from the English Government, towards its resources as a place of refreshment for vessels passing. As will be found by the subsequent description, its natural advantages have been signally improved; however, in the year 1881 the government decided to abandon the island as a sanatorium, and to reduce the establishment, retaining it only for service as a small coal depôt.

The position of Ascension seems to be tolerably well ascertained, and may therefore be depended on as a point of departure, as may be seen by the results given by the following observers.

Capt. Sabine, who made some observations in 1822 for fixing the position of this island, gave it as in lat. 7° 55′ 48″ S., long. 14° 23′ 46″ W. These observations consisted of 164 (16 sets) lunar distances, made in the new Barrack Square during the months of June and July in the above year.

According to the chronometric measurements of Captain Foster from St. Helena, Barrack Square is in long. 14° 25′ 23″, and by a similar measurement by Admiral FitzRoy, it is in 14° 24′ 40″ W.

Commodore Owen gives the longitude of Georgetown, from observations made in the *Leven*, in 1826, in the N.W. Bay of Ascension, as 14° 26′ 20″; and Capt. Vidal, in 1828, made it 14° 26′ 12″. The mean of these five authorities is 14° 25′ 18″, the longitude which is given in the table.

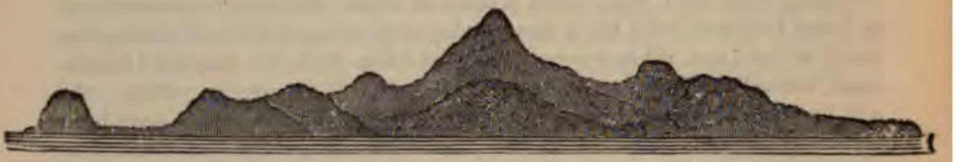
The island was more completely surveyed in 1838, by Capt. G. A. Bedford, R.N., who takes Admiral FitzRoy's longitude, viz., 14° 24′ 20″, as that of Barrack Square.

The Island of Ascension is of an elliptic form, its greatest diameter from East to West being 7⅝ miles, and its shortest, from North to South, 6 miles. The area of its base at the surface of the sea is 38 square miles, and its circumference about 22 miles. It had formerly a population, chiefly of Royal Marines, of about 500.

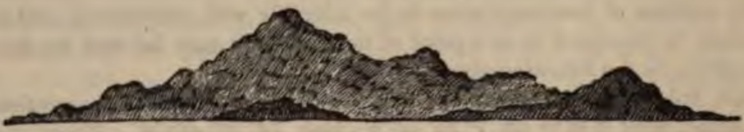
Ascension is of volcanic origin, and of comparatively recent formation, its surface being exceedingly irregular, and presenting from the sea a barren and forbidding appearance. The highest peak, or *Green Mountain*, is elevated

2,818 ft. above the sea. and may therefore be seen from a frigate's deck at the distance of 65 miles. The latitude of this summit is 7° 56′ 58″ S., and if the longitude of the fort be 14° 25½′, that of the peak will be 14° 21′ 9″. From the summit of the Green Mountain about forty hills may be seen of different magnitudes, being extinguished craters, which have at different periods of the volcanoes actually given vent to its fires. From many of these craters one may trace distinctly the direction of the lava currents on their way to the sea.

All the different varieties of the lavas of Vesuvius may be found here, apparently in a rapid progress of decomposition, so that at some future period this island, like other volcanoes, will be one mass of rich mould. Many of the round conical hills are already fit for being planted with vines, their soil being composed of ashes and a ferruginous earth, a decomposition of calcined ores of iron. Of this description is Red Cross Hill, near the anchorage, having an elevation of 816 ft. above the sea; but so dry and porous is the soil, that no sooner does the rain fall, than it is absorbed and disappears.



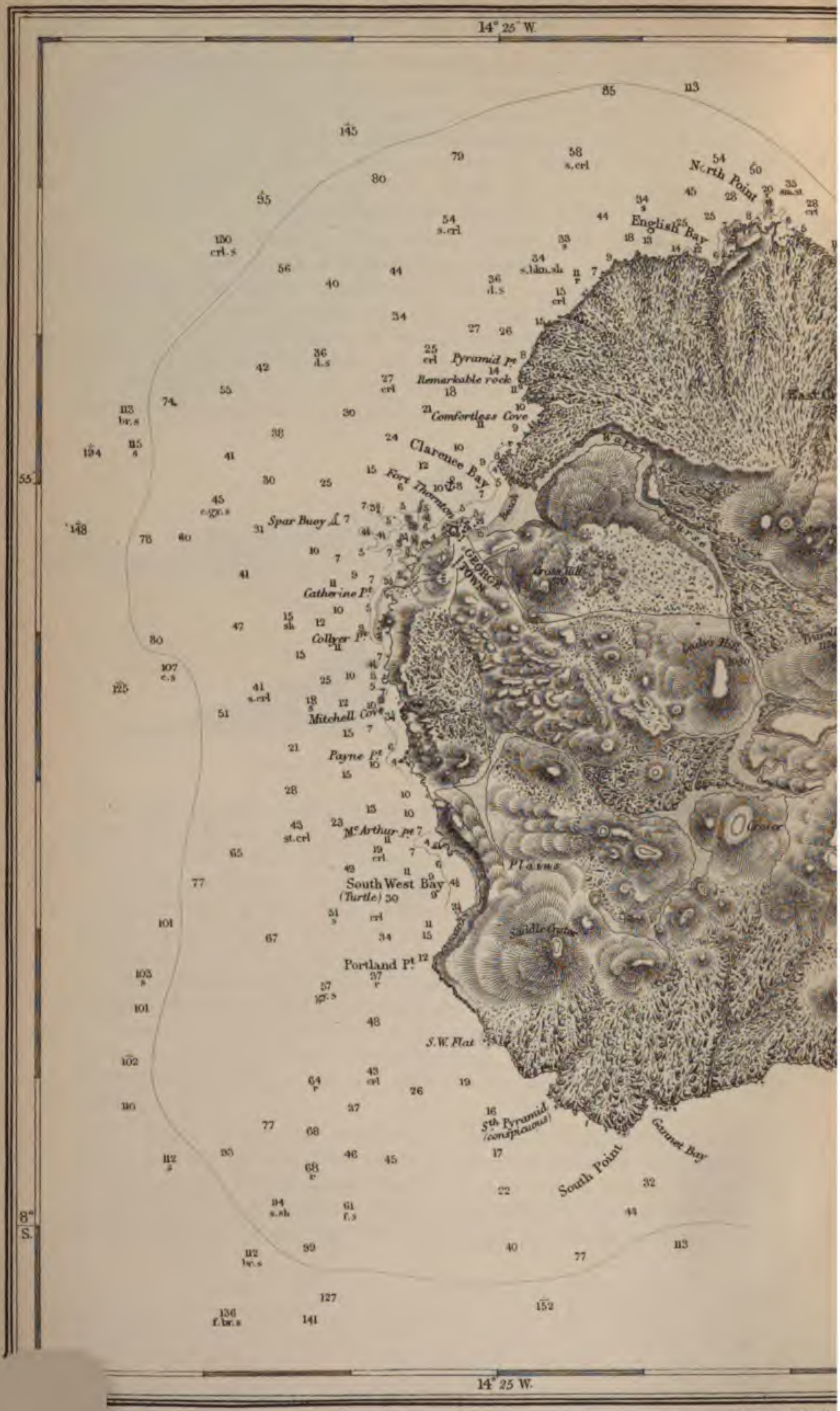
Ascension Island, N.W. by N. ½ N., 9 miles.



Ascension, bearing West, distant 21 to 24 miles.

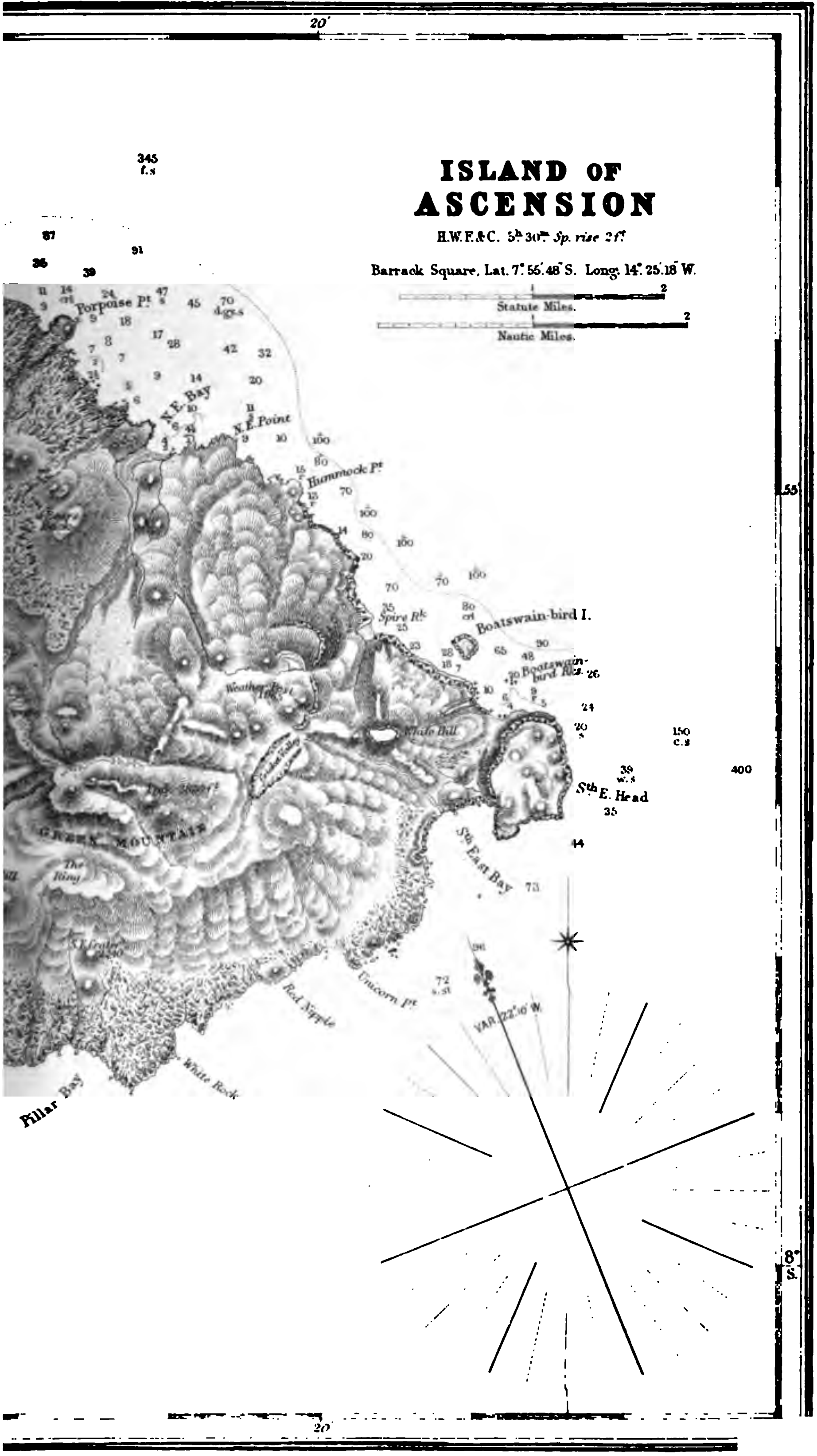
The principal cultivation is on and above Green Mountain, where it rains more frequently than on the less elevated parts of the island. The principal garden is 2,500 ft. above the sea; here the climate is delightful, the temperature during the daytime being generally about 74°, that at the landing place near the fort being 85°. The temperature on the peak is still lower; my thermometer, exposed to the current of air sweeping over the peak, fell to 60°; this was at 1^h p.m., the instrument being in the shade, and the sun shining at the time. The summit of Green Mountain is covered with rock roses and several species of fern and mosses, indigenous to the island. There were about 100 acres of land cultivated in 1830, and above 1,000 more fit for cultivation by the plough, on and about Green Mountain, independent of many ravines and hollows, containing a rich soil, where no doubt fruit and other useful trees could be planted.

The climate of Ascension is perhaps as healthy as in any part of the world, and its salubrity is no doubt owing to the constant trade wind blowing in a moderate breeze, ventilating and cooling every part of the island; the dryness of the air, and the absence of marsh or moist soils contribute to the elasticity and buoyancy of the air, and render the island a most desirable spot for an


14° 25' W.
North Point
English Bay
Pyramid Pt
Remarkable rock
Comfortless Cove
Clarence Bay
Fort Thornton
Beach
Spar Buoy
GEORGE TOWN
Cross Hill
Catherine Pt
Collyer Pt
Mitchell Cove
Payne Pt
McArthur Pt
Crater
Plains
South West Bay
(Turtle)
Saddle Crater
Portland Pt
S.W. Flat
Sth Pyramid
(conspicuous)
South Point
Gannet Bay
55'
8°
S.
14° 25' W.

R. H. LAURIE, 53

To face page 240.



ISLAND OF ASCENSION

H.W.F.&C. 5h 30m *Sp. rise* 2ft

Barrack Square, Lat. 7° 55′ 48″ S. Long. 14° 25′ 18″ W.

. LONDON

invalid, who might be transplanted from Tartar Stairs to the mountain in two hours, the distance being 7 miles, from a temperature of 84° to one of 74°.[*]

Abundance of purslain grows among the rocks, stones, and crevices of the cliffs; this vegetable is eaten by the cattle, and is capable of keeping them alive and in tolerable condition, as was evident from a bullock making his escape, and being absent five or six months, during which time he had nothing to eat but purslain.

The animals that are found in a wild state are rats, cats, goats, and land-crabs; the cats are numerous, but instead of destroying the rats, they take up their abode in the neighbourhood of places frequented by the different species of sea-fowl that visit the island. The goats, rats, and land-crabs are great enemies to farming, destroying all sorts of plants and fruit; they are, therefore, killed in great numbers by the garrison, and may ultimately be extirpated. The weather side of the island is high and inaccessible, with an iron-bound coast, and deep water. No part of the coast is accessible from S.W. Bay, round the South point of the island, and as far as N.E. Bay.

From the South point of S.W. Bay, and along the lee side of the island to English Bay, there is an excellent anchorage in from 10 to 20 fathoms water, sand and mud; within the distance of 6 miles 300 sail might be anchored at the distance of 100 fathoms from each other; for, although the coast from the fort round to S.W. Bay be rocky, with foul ground extending about half a mile into the sea, yet I found the bottom perfectly clear without the depth of 10 fathoms.

I have already stated that upwards of forty craters have, in former times, been in a state of activity. Now the island lying within the limits of a constant brisk S.E. trade wind, the ashes, pumice dust, &c., ejected by the volcanoes, have been carried by the wind into the sea to leeward of the island, and formed an excellent anchorage; the bank thus formed has, in the course of time, been augmented by vast quantities of small shells, ground up together, and polished by the action of the waves; and it is those fine pieces of shells that form the various beaches on the lee side of the island, where the sea turtle deposits her eggs to be hatched by the heat of the sun.

Wherever there is a prevailing current in the air or ocean, at an island, the dust in the air, or the mud in the sea, is carried by the current, and deposited to leeward, where a bank is formed on which ships may anchor; this is the case at St. Helena, Ascension, the Madeiras, the Canaries, Cape Verde Islands, &c.

Ascension is visited by the sea turtle between Christmas and Midsummer, and it is supposed that during the above period each female makes three or four nests. The animal remains on the coasts of the island till fifty or sixty eggs are fit for being deposited in the sand. She then lands on the beach, between ten o'clock at night and four in the morning, and, going sometimes

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[*] The year is divided into two seasons—the hot months commencing in December, and ending in May, the cool season extending through the remaining months. The thermometer ranges throughout the year in the low lands from 70° to 88° (it has been as high as 90°), and averages 83°; in the high lands it ranges from 62° to 82°, and averages 70°. The island, I apprehend, is not subject to a rainy season.—*Captain Brandreth, R.E.*

150 or 200 yards above high water mark, digs a large pit, about 8 or 10 ft. in diameter, and 2 or 3 ft. deep, where the eggs are deposited and carefully covered with sand; she then leaves them to nature. In about nine or ten weeks the young turtle breaks its prison, and, working its way upwards through the sand, gains the surface, and proceeds directly to the sea. Should this journey happen in daylight, many of the young animals are picked up and devoured by the man-of-war bird, who may be seen hovering over the turtles' nests. For this species of warfare in destroying the young turtle, the man-of-war bird is shot, or otherwise destroyed, by the officers of the garrison.

There are abundance of excellent fish to be caught among the rocks throughout the year, such as rock cod, conger, cavalhos, &c.; they are so plentiful that a boat's crew may catch enough for a frigate's ship's company. The best place for fishing is on the reef, near the anchorage, beginning with a piece of salt pork for a bait, and afterwards cutting up a fish for bait. Cray-fish are also caught near the mouths of caverns amongst the rocks towards English Bay. The method is as follows:—hang a piece of fish or pork by a string a short distance below the surface of the water at the mouth of a cavern, the cray-fish observing it will rise to the bait, and may be taken by hand.

The coast to leeward of the island is bold and clear from English Bay to the fort near Tartar Stairs. About a mile to the N.E. of the fort there is a small bay, with a spot of sand on it, on which a boat may land among wild and irregular climpers. This spot has been dignified by the name of Comfort Cove (now called Comfortless Cove), and extolled very much above its merits. From the foot of Fort Cockburn round to the westward as far as S.W. Bay, the coast is, as already observed, rocky. The reef runs out about seven-tenths of a mile from the fort in a N.W. direction. It is composed of uneven masses of hard, pointed lava, with spots of white sand in the hollow places; there are many of these pointed rocks on which a ship would strike, and on some of which ships have actually struck; and to prevent such accidents for the future, a large buoy is now moored near the extremity of the reef, on a rock having 30 ft. water on it. The following are its marks:—the flagstaff on the fort in a line with the N.E. corner of the jetty, near the crane at Tartar Stairs, and the peak of the Green Mountain just touching the edge of Red Cross Hill. Should the buoy be gone, by keeping in 10 fathoms a ship will avoid all the dangers on the reef.

It sometimes happens that a very heavy swell sets in from the south-westward, occasioned by *gales of wind* without the limits of the trade winds in the South Atlantic. The long swell rolling in against the wind, and meeting with shoal water and the uneven rocky bottom of the reef, breaks high and with violence, sweeping away thousands of tons of sand from the beach into deep water; this sand is again thrown on shore in fine smooth weather.

About half a mile inland from S.W. Bay, and behind the lava currents, lying near the beach, there is a tract of land of comparatively smooth surface, and of considerable dimensions; the soil is very rich, but so dry and dusty, as seldom to exhibit any other verdure than a little purslain. A little farther to the south-eastward, and behind some high conical hills, there is a sandy plain, having an area of perhaps 20 or 30 acres. This level is surrounded by the above-mentioned conical hills on the North, and on every other side by high ridges of lava, through which the rains have worn "fiumari," or watercourses by which considerable quantities of sand and pumice have been discharged into the plain. I could trace very distinctly a line of pumice and other floating materials at the foot of the hills along the lee side of the plain, left as the *last high-water mark*, and showing most clearly that at times there has been a depth of several feet of fresh water in the valley, a quantity sufficient to supply the island for many years. This affords the strongest proof of the occasional heavy rains that must fall at Ascension, and points out the propriety of constructing tanks in eligible situations.

Ascension, without water and wood, was formerly frequented only on account of its turtles. "Of this article," says Capt. Leslie (1775), "the island furnishes the finest in the creation; the females from, I suppose, hundreds of leagues around, come here to lay their eggs, on which employment they are taken at night; so that they are not only fat and large, but in the highest perfection for eating. Their weight, in general, is from 400 to 700 pounds. They are, of all I ever tasted, the fattest and finest; all others I ever saw before bear no comparison with them."

During the confinement of Napoleon on the island of St. Helena, the British Government, in 1815, deemed it requisite to take possession of Ascension as a military station, and a sloop's crew, under Lieut. Cuppage, was maintained upon it, who contrived to form a few small gardens; after which, in 1821, Major John Campbell, with two lieutenants and a small party of marines, proceeded in the *Heron* brig, Capt. Hanmer, to garrison the island for three years.

Near Dampier's Springs a house was built, and gardens laid out for the cultivation of vegetables; but little more was then effected on the island, except the erection of some scattered huts on the leeward shore, and the clearing of a few necessary roads. After the death of Napoleon, it being determined by the Admiralty Board to make Ascension a depôt and place of refreshment for the use of the African squadron, a detachment from the corps of Royal Marines relieved the naval garrison in 1822. A year after this epoch in the annals of Ascension, a fever of the most virulent kind was unfortunately introduced on the island by H.M.S. *Bann*, which for a while suspended the exertions of the new settlers. Many women and children, the families of the soldiers, were by this time located there, the population amounting altogether to about 150 souls; but, sad to say, of these more than a third were swept off in a short space of time by the exterminating pestilence.

The following particulars of this island have been given by Mr. Webster:—On the 10th of February, 1830, H.M.S. *Chanticleer* left St. Helena, and, after a delightful passage of four days, arrived at Ascension. The scene from the anchorage has a barren aspect, although warmed by the light colour of the sand. The island is interspersed with broken ridges of lava and scattered hills, separated by extensive plains. The surface generally consists of ridges of naked rock, hills of cinders, and plains of ashes, dust, and lava. The general contour of the hills, and the blending of their different colours, impart a soft and pleasing effect on the mind of the spectator; the blackness of one hill is relieved by the ash-grey tinge of another, and the brick-burnt soil of one cone is contrasted with the pumice or brown lava of an adjacent or opposite one. By this variety and alternation of colour the monotony which would otherwise prevail is broken, and the scenery in some parts assumes a wild and picturesque character.

On the lee side of the island is the garrison establishment, now dignified by the name of *George Town*, and consisting of wooden houses. Besides these, contiguous to them, is the government store, a substantial stone building; a very neat and respectable hospital establishment on a small scale, for the reception of patients from the ships, and for the purpose of supplying them with medicine; a very good smith's shop; a public mess room, and a row of humble buildings for the garrison officers. On Cross Hill, close to the anchorage, is a signal post, which communicates with the mountain house; and Captain Bate, the commandant, had erected a house for himself on the brow of a hill to the eastward of the garrison. An admirable pier or jetty, terminated by a rock, forms the landing-place, on which is a crane, for the purpose of loading and unloading boats.

The hills are numerous and of various heights, but the most elevated one is that called the *Green Mountain*, from the light hue of the verdure on its summit. It is nearly in the centre of the island (toward the S.E.), and is 2,818 ft. in height above the sea, rising as a graceful oasis amidst waste and desolation; for around it is to be found neither verdure, shade, nor shelter, but one entire field of lava. The lofty ridge of the Green Mountain arrests the watery vapours that would pass it, and supplying George Town, by means of pipes, constitutes the chief blessing of the island. It is said also to have 1,200 acres of land on its summit available for agricultural purposes. There is a good road from George Town to the Green Mountain, the distance to the foot of it being 3½ miles (English), and to the summit 6 miles. A party of men are usually employed on the Green Mountain in cultivating the land, attending the tanks, and looking after the live stock. The neat little establishment, called the *Mountain House*, is at an elevation of 2,250 ft., and is romantically situated on the brow of the hill. A little garden is attached to it, backed by a wall of black cinders, through which rushes a stream of cool refreshing water. The view from this place over the whole island is awfully grand; not a vestige of green is to be seen below the favoured mountain. Independent of the pleasure of the ride, it is worth the excursion only to obtain a draught of the cool water dripping from the fountain. Craters of extinguished volcanoes are seen in all directions over the mountain, amounting to about thirty. They vary from 100 to 300 ft. in height, and are in general circular. One of these, more terrific and rugged in its appearance than the rest, is called the *Devil's Riding Ground;* this being an elevated mound, about half a mile in circumference, with a road winding round it to the summit, walled in on the lower side by a ridge of lava.

The Green Mountain supplies the party of George Town with water, vegetables, fodder for horses, and pasture for a few cows. In the dales, here and there, a few bananas have been produced; and the pineapple, though deficient in flavour. The Cape gooseberry, a delicious fruit, is very abundant on the mountain, and affords the luxury of a tart; it is a species of winter cherry. The castor-oil plant thrives there, and a crop of Indian corn has been produced. The residence on the mountain is cool and agreeable, the temperature being generally 12° below that of the plains; but it is not without its disadvantages, being continually enveloped in mist, which renders the habitations damp, but not unhealthy. Goats were at one time very plentiful on the island, but they are now reduced to a small herd, and hunting them forms one of the chief amusements of the island.

The island is very much infested with rats. Domestic animals are reared with success, and the fowls form a valuable supply for the table. The Green Mountain abounds with Guinea-fowl, which affords amusement to the sportsmen during the season, from April to September. On the northern side of the mountain is the drip of water called *Dampier's Springs*, because discovered by the celebrated navigator of that name. This he did by watching a flock of goats, and observing where they went to drink. It will be remembered that Dampier's vessel, the *Roebuck*, foundered near Ascension in 1701, and that the crew saved themselves on the island, where, after staying three weeks, they were taken off by an English ship. These springs are the treasures of the island.

The turtle season commences in December, and lasts till May or June. During the height of the season from forty to fifty are turned in a night; they are taken when they come to deposit their eggs in the sand. There are three or four bays to leeward which they most commonly frequent, and two men are placed during the season to turn them at night; they are then conveyed in carts to ponds where they are kept for provision. It is remarkable that no male turtle have ever been seen; and that the young ones, after they are hatched about four or five months, and are about the size of one's hand, crawl away, and are never seen again until they are 400 pounds weight. They are generally from 400 to 800 pounds weight when taken in the season; and are kept in two ponds, about 400 to 500 being the number generally taken.

Amongst the articles of food, the eggs of the wide-awake furnish an important item, *ten thousand dozen* being often taken in one week during the season; they resemble plovers' eggs, and though the bird is small, the egg is nearly the size of that of the common fowl. The season is irregular, about three times in two years. The indigenous birds are nine in number; the beautiful man-of-war bird, black with white breast and a stripe of white on each wing, the wings measuring 7 ft. from tip to tip; two kinds of gannet, two booby tribe, the wide-awake, two petrel, and the boatswain bird, with its long feathers depending from its tail. All these are in considerable numbers, and whiten the rocks where they haunt. The man-of-war bird feeds on fish; but not being able to take its food, it watches the booby returning with a fish, pounces upon it, and carries off the fish. The fish for food here are the rock cod, the cavalha (rather coarse when large, but good eating when small), the conger eel, their best fish; the snipper or soldier (a beautiful fish, quite red and golden when first caught); and a quantity of a fish, with dark skin and beautiful bright purple streaks, abound, but are not good eating; oysters also abound, but are rather coarse, and not much eaten. They have mullet, but I have not seen it. We have turtle in various ways—soups, broth, excellent cutlets like veal, and in pies, which are very good.—*Journal of the Geographical Society*, vol. v., p. 262.

The *climate* of Ascension is considered as singularly healthy. In the heart of the S.E. trade wind, in the midst of the ocean, with the driest soil in the world, and the total exclusion of anything like swamp or marsh, and the absence nearly of all vegetation, there is nothing to taint the air, or to produce impurity. Fever has occasionally been imported from the pestiferous coast of Africa, but there is none epidemic or peculiar to this island. A mild species of dysentery is the most common complaint, and beyond this we cannot specify any. The people on the island have a healthy appearance, and they expose themselves to the sun without any ill effect. Sores heal readily, fractures unite quickly, inflammatory complaints are not obstinate, and every one enjoys uninterrupted good health. Such are the effects of pure air, and so little is high temperature conducive to disease, that the enfeebled invalid from Africa recovers energy, and strengthens under the refreshing effects of the sea breeze. The thermometer ranges in the day from 84° to 92° in the shade, during the period in which the sun has South declination, the hottest time at Ascension, or from September to March. It is rarely below 82° in the night. The barometer never rises above 30·1, nor falls below 29·8; the mean for the whole year being 29·95. During the hottest period the barometer is lowest, reaching 30·0; but, during the cooler half of the year, the barometer stands higher, and generally above 30·0. From March to September the thermometer ranges from 76° to 82°; and in the evening there is sometimes a little fall of dew, but it is a very rare occurrence.

The rainy season at this island is about March and April, and is sometimes attended by only a few slight showers; while other seasons are remarkable for the quantity of rain that falls. The average fall of rain throughout the year is very limited, and it is this circumstance that constitutes the great drawback to the natural advantages of the island. After the rains the air resounds with the chirping of crickets, the plains become decked with a short-lived verdure from the purslain, the rivers are swollen and even glutted for a day, and the nourishing fluid is gone, not to return, perhaps, for years.

The coolest season of the year is the driest. During the months of March and April lightning is sometimes seen in the North and N.W. quarters, and an occasional clap of thunder is seldom heard. In May the clouds have very frequently a motion from the West and N.W. against the usual trade, and light airs from those quarters also occur. The rains in the lower part of the island generally occur in the night, or in the very early part of the morning.

But what has been said of the climate of Ascension does not apply to its *Green Mountain*, which is described in its proper place. Here the temperature ranges from 60° to 86°, averaging about 75°; and the height of the barometer about 27·75. The mountain is generally more or less obscured by mist some part of the twenty-four hours, and it will be shown hereafter that the condensation supplies a large quantity of water for the use of the residents, with some to spare for that of shipping.

The phenomenon called the *Rollers* has been described on pp. 138—145.

In the month of March, 1833, the island was found to be fortified at all accessible points. A battery was constructed, close to the landing-place, and near this is a large tank containing 1,700 tons of water. Iron pipes, of 3½ inches bore, extending 33,000 ft., were laid down, reaching from the Green Mountain to the town, and brought down to it, in many places perpendicular, particularly as far as Dampier Spring. A tunnel has been cut through a solid mass of cinder, 200 ft. above the government buildings at Green Mountain, to carry the pipe through. This tunnel is 930 ft. long, and 6 ft. 6 in. in height: it was cut by six men in three months. The stock consisting of horses, cows, and sheep, is also raised there; the latter being brought principally from the Cape of Good Hope, and are disposed of, on government account, to any ships requiring them. There are about 4,000 acres of pasture and arable land, including the gardens, &c., on Green Mountain, in excellent order, and which produce many European as well as tropical fruit and vegetables. Wild goats, still numerous, are hunted for the use of the hospital. Wild Guinea fowl, and also the common fowl, are numerous, and afford good sport for a bold sportsman, but not for a timid one. From the scarcity of horned cattle, and the difficulty of providing provender, fresh beef is issued but once a year; turtle, one and a quarter per man, or twice a week. The island is under martial law, no settlers being allowed to reside upon it; consequently the whole labour is performed by the marines, who are allowed rations for extra services. Want of rain was a great drawback; the supply of water from the springs being very limited.

It is a curious fact, that in later years a considerable change in the climate has been perceived. For months together, I have been told by several who have been resident from three to seven years, as well as by Captain Bate, not a cloud would pass over the heavens, nor a drop of water fall; but since the land on the mountain has been so much cultivated, a gradual increase of rain has taken place; seldom more than a day now passes over without a shower or mist on the mountain; and during the first ten days we were here, November, 1834, constant little showers fell. The mountaineers, like the Children of the Mist, inhabit a region of clouds for many months in the year, and clothe themselves with woollen garments; while the lowlanders are frequently perspiring at every pore, though clad in linen.

The anchorage is in Sandy or Clarence Bay; a prominent rock, on which is a fort, forming its western boundary. Ships may anchor in any part of this bay, in moderate depths of water.

Commanders of ships coming from the eastern side of the island, intending to anchor or cruise off the settlement until they have gained supplies, must observe that no safe anchorage can be found to the *westward* of the fort, neither is the shore safe to approach within 1¼ mile of it to the *westward*.

The best guide to clear the reef and rock lying to the N.W. of the anchorage, and on which many vessels have grounded, is to keep the houses and barracks open to the eastward of the fort, and never to shut them all in with, nor open them to the *westward* of, the fort, unless the distance from the land be at least 1¼ mile. In the latter case they would be in great danger of striking on the reef above mentioned, the spit or rocks of which lie nearly a mile from the nearest point of the shore.

A buoy, painted black and white, is laid on the spot. When this buoy can be seen, a vessel should never pass to the westward of it, unless her distance from the land be at least 1¼ mile. The sea does not always break upon this rock; but there is always a considerable swell passing over it.

Ships approaching Sandy Bay, from off the *western* side of the island, must be careful not to advance nearer to the land than 1¼ mile, until the houses and barracks be opened to the eastward of the fort. They may then stand into Sandy Bay to their own depths, free from all danger.

By attention to the above observations, it will be impossible for ships to meet with accidents; for on all other parts of the island the coast is bold (North not excepted), and may be approached to within a cable's length.

At the 12-feet rock, the stairs, called *Tartar Stairs*, bear by compass S.E. ½ E. one quarter of a mile. At the 15-feet rock the same stairs bear E.S.E., nearly half a mile. These rocks are only two of many that compose the reef extending from the foot of the fort along shore to the S.W. bay, and running out to seaward a large half mile from the shore, being a formation of hard pointed lava rocks, with spots of white sand.

A large buoy is, or was, on the N.W. point of the reef, on a rock having 30 ft. of water over it, with 8 fathoms outside of it. At the buoy the crane at Tartar Stairs bears by compass S.E. by E. ¾ E. seven-tenths of a mile. No ships should go within the buoy, or come nearer to the reef than 10 fathoms of water; for, during a long swell, the sea breaks on the reef from within a cable's length of the buoy the whole way to the shore.

The landing place is on the flight of steps at the extremity of a wharf; a small crane near it assists boats in approaching, and persons on landing. The beach consists of very small fragments of shells, in some places so firmly compacted together as to form slabs, which may be worked into tombstones, steps of doors, or broken and burned for lime.

The island was exclusively a naval depot for the service of H.M. ships, and as everything had to be brought here, it was found necessary to restrict the issue of stores to merchant vessels. In October, 1866, the Board of Trade issued a notice to the effect that *water* would only be supplied to vessels in great need, in quantities sufficient to afford each man on board a gallon a day for the voyage to Pernambuco, which will occupy about 10 days, at a cost of about 8*s*. per tun.

As many ships called here for refreshments to avoid the port dues at St. Helena or elsewhere, and as H.M. ships were consequently obliged to be put on short allowance of water and provisions, in 1867 the prices of supplies were doubled, with the view of making the rates almost prohibitory, and from January 1st, 1868, the following port charges were put into operation:—

	s.	*d.*
For every merchant ship or vessel, British colours or foreign, arriving at the island for any purpose whatever (except she be on Government service), per registered ton	0	1½
For every cask, case, or package shipped from the island on board a merchant ship or vessel	1	0
For the use of the Admiralty hoist, every ton or part of a ton raised or lowered for any merchant ship or vessel	5	0
Health officer's fee	7	6
Certificate of clearance	2	6

TIME SIGNAL BALL.—In order that vessels calling at the Island of Ascension may readily find the error and rate of their chronometers, a time ball is dropped daily (Sundays excepted) from a flagstaff at the master's cottage, precisely at 1 o'clock of Greenwich mean time.

The master's cottage is situated immediately to the southward of Hayes Hill, and is the only cottage near it bearing a flagstaff. The ball, when hoisted ready to drop, is at a height of 90 ft. above the level of the sea, and may be readily seen from the anchorage. The longitude of the flagstaff is assumed at 14° 25′ 30″ W., or $0^h\ 57^m\ 42^s$; the ball, therefore, is dropped at $2^m\ 18^s$ after noon, mean time at Ascension.

Vessels not intending to remain for the usual time of showing the signal may have the ball dropped at any convenient hour of Greenwich time by making a request at the master's office at the cottage. Vessels can also be reported at or communicate by signal with Lloyd's Commercial Code Signal Station here.

Lights.—Two small *fixed* lights, *red* and *green*, are shown from a hut on the pier in Clarence Bay, when vessels are approaching, and a gun is fired should a vessel be seen standing into danger.

There is no difficulty in going into the bay. Run down to windward of the island, and shave close round the North end to ensure fetching well in to windward, as it blows right out; attention to the flaws is necessary to avoid being taken aback, and with good management a ship will always go to the anchorage without making a tack. Sail should be gradually reduced, as the ship runs down, to topsails, foresail, jib, and spanker: and the anchor cock-billed and ready, with a good scope of chain, say 50 to 60 fathoms, as it sometimes blows fresh off the high land. The boarding officer will suggest to a stranger the best place to anchor. On rounding the North point the ships in the bay will be seen, and then Georgetown, which is a perfect pattern of neatness and order. The public buildings, barracks, hospital, fort, &c., and the residences of the officers, have quite a picturesque effect, standing high above the beach of Sandy Bay. The houses of the Government *employés* lie in a valley, and are not distinctly seen from the anchorage. There is also an African town to the right of the landing place, inhabited by Kroomen and other Africans in the service of Government; they form a distinct community, and their village is called *par excellence* Krootown.

The whole island is (was) exclusively a naval depot. The captain of the guardship resides on shore, and is governor *pro tem.;* his period of office is three years. He resides in a pretty cottage on the side of a hill, named Hayes Hill; there is a time-ball here which is dropped daily. This station is much liked by the officers, as being able to have their wives and families with them, the tedium of duty for three years is lightened. They are all very hospitable and kind to strangers visiting their solitary island, and I can bear testimony to many pleasant hours spent in their company.

They have a very nice little church, which forms a picturesque object from the Roads; also a news-room, in which are the latest papers and periodicals, to which strangers have access during their stay at the island, through the courtesy of the officers, and to which it is desirable that contributions should be made of the latest papers from the port the ship has left. The whole town looks as if built with cards. The verandahs of the houses are filled with flowering shrubs, which give a pretty appearance, and the ladies take great delight in them. The whole of the adjacent country, for miles round, is nothing but scoria, and immense blocks of lava and slag, without a blade of grass, save in some of the valleys, where a few flowers find root, "and waste their sweetness on the desert air." There is a very neat little burying-ground about half a mile from the town, on the West side of Sandy Bay, and where many officers who have come up sick from the pestilential bights of Africa lie entombed; few others die here, the climate being exceedingly healthy, and no epidemics are known. I was struck with the beauty of some of the tombstones. They appeared to be of a description of stone I had never seen previously, and I had made up my mind to procure a few specimens to carry home to England, when, on enquiry, I found they were merely wood, painted with some preparation, and then covered with repeated coats of the beautiful coralline sand from the beach, which soon becoming hard, the epitaphs are carved on them, and great care seemed to be bestowed on these relics of the dead.

There is a post-office in the governor's office, where letters are taken charge of. The mail, however, requires two months from England, having first to go to the Cape, and round St. Helena.

Ships can leave at any time (day or night). All that is requisite is to heave up the anchor, set the fore-topsail; and, having catted and fished the anchor, make sail as the ship leaves the island. This has always been my plan.

The rollers set in occasionally, and for a day or two it is sometimes not safe landing, which has caused many ships to leave, not being able to get off stores, &c. But there is a bay between the town and the North point, where boats can always land on these occasions (if dispatch is a great object). Generally, the ordinary landing-place can be used. It is a curiosity, too, in its way, being at the face of a projecting rock, through which a passage is cut, and a staircase and a small crane is fixed, with a rope to swing a person into or out of a boat when there is much swell. It is named Tartar Stairs, and is sheltered by a rock outside, named Marline Spike Rock, which in some measure prevents the swell from rolling in. The sea in ordinary weather never breaks here, and care is only necessary to keep the boat from striking the rocks. This is easily done, as buoys are laid down for them to ride by and be hauled off, or slacked in, to the landing, as required. A sergeant of marines is always in attendance, and a flag is hoisted when landing is impracticable. A large crane on the rock above is used to discharge cargo, coal, &c., when the weather is favourable. A reef runs out to the northward, through the centre of the harbour, with a perch on the outer extreme, having a passage inside it. On this reef at least one ship has been lost; but it could only have been by the greatest carelessness or neglect that such an event could have occurred, as it is quite visible.

The *Tortoise*, an old Dutch Indiaman, many years the guardship of Ascension, yet lies in the roads, but is now converted into a coal hulk. Many visitors to the island will remember the hospitality of her officers to passing strangers. Fish can be either bought from the blacks at Krootown, or caught at the anchorage with very little trouble. Cavallo, bonito, snapper, barracouta, &c., being in abundance. Turtle are game, and are protected till out of sight of the island.

Many people are of opinion that the vegetation at the Green Mountain will gradually extend itself over the island, as the hills wear away, and soil accumulates to afford root for it. Rain but seldom falls: I have known none to have done so for eighteen months at a time. The inhabitants are always kept on allowance of water, never exceeding two gallons each, and sometimes they are reduced to one only. On one occasion, the *Tortoise* had to be sent to St. Helena for a supply; this, however, is not likely to occur again, as a former governor made many reservoirs to collect the article; but of course care is necessary. But torrents of rain must sometimes fall, if one may take the gullies hollowed out by it as a criterion. It, however, at once runs off, without penetrating the hardened soil. Vessels coming from India, and proposing to call here, should bring plenty of potatoes, onions, pickles, preserves, and paddy, or gram, and also hay, all of which meet a ready market; also a few nick-nacks. Blue silk, pith hats, cigars, &c., are always in demand, and I would recommend a master being liberal with the first-named articles, and he will find his account in it by being assisted in many ways.

9. THE ISLAND OF ST. HELENA.

The longitude of the Observatory on Ladder Hill, at St. Helena, as given in the table, 5° 42′ 30″ W., is the result of the observations of Lieutenant Johnson, in 1830; these consisted of fifty-four observations of moon culminating stars compared with observations at Greenwich, Cambridge, and the Cape of Good Hope. M. Daussy, from the same observations, calculates it as 5° 42′ 51″. Captain FitzRoy places it in 5° 42′ 19″. Captain Foster, who connected James Town chronometrically with the Cape of Good Hope, places it in 5° 43′ 15″. In Lieutenant Raper's table it is stated as 5° 44′ 48″, or 1½′ W. of Lieutenant Johnson's result. Commodore Owen, from his observations in the *Leven*, in 1826, gave it in 5° 44′ 48″; and according to Captain Heywood it is in 5° 44′ 15″. The latitude of the Observatory is 15° 55′ 26″ S.

The magnetic observatory at Longwood is determined to be in lat. 15° 56′ 41·2″ S., long. 5° 40′ 28″ W., agreeing with Lieutenant Johnson's observations.

The island was surveyed by Major Rennell, but it was never published. Another survey was made in 1816, by Mr. Baines, C.E., but the most perfect topographical map is that from the trigonometrical survey by Captain Edmund Palmer, R.A., F.R.G.S., in 1851-2.

From this survey it is 10⅝ statute miles in extreme length, East and West, between the King and Queen Point and West Point, and 7 miles North and South between Powell Point and Sugar-loaf Point.

The principal hills are Diana's Peak, the highest point of the island, about the centre of the southern ridge, 2,704 ft.; Cuckold's Pit, near to it, 2,684 ft.; High Peak, 2¼ miles to westward, 2,635 ft.; Halley's Mount, 2,467 ft.; Flagstaff Hill, on the North side, 2,272 ft.; White Hill, above Sandy Bay, on the South side, 2,425 ft.; Lot, 1,430 ft.; Lot's Wife, 1,550 ft.; besides very numerous others.

The area of the island is about 47 square miles, or 30,300 acres, of which 1,133 are cultivated, 7,652 acres pasture, and 21,515 are waste.

Little care is taken to raise more than a scanty supply of vegetables and forage for the inhabitants and passing shipping. Owing mainly to the stimulus given by the late governor, Sir Charles Elliot, some attempts have been of late years made to revive the orchards which once abounded on the island. A large number of cinchona trees of the best description have been introduced, and appear to thrive well at an elevation of 2,000 ft. Renewed attention has also been given to the growth of coffee, which can be grown of the finest quality, and yields abundantly. The fibre procured from the *Phormium Tenax* is also prepared here, and is of the best quality; 615 bales, valued at £1,867, were shipped to London in 1879. An attempt is also being made to acclimatize the ostrich, for which the place seems suited. The soil being rich, the inhabitants do not trouble to utilise the guano which is found on the coast, and used occasionally to freight a vessel.

At certain seasons fish abound, which are caught with hook and line, nets not being used. Of these only sufficient are caught for daily consumption, no care being taken to pickle and salt when the fish are plentiful.

The population, according to the census of 1871, was 6,241; in 1861 it was 6,444, or 3,370 males, and 3,074 females. Besides this, in 1862, 1,614 liberated Africans were landed here from prizes, and 1,479 of them emigrated to the West Indies. In 1881 the population amounted to 5,059.

The returns of merchant vessels calling at this port for supplies was 577 in 1879, with a total tonnage of 425,811; the value of imports in 1879 was £64,585, exports £5,127 as compared with £12,653 in 1878. In addition to this, the value of the oil from the whale fishery, transhipped here to the United States, amounted to £32,190 in 1879.

This minute spot lying such an immense distance from the continents on either side of the South Atlantic, would be one of the most isolated and solitary places in the world, were it not for the fact that it lies, like Ascension, on the great homeward thoroughfare from the Indian Ocean.

St. Helena lies within the limit, and in the strength of the S.E. perennial or trade wind; and its roadstead is off James Town, on the N.W. or leeward side of the island. Westerly or northerly winds seldom blow with force or duration, so as to endanger the shipping in the road.

History and Description.*—The island was discovered by the Portuguese Admiral Joao da Nova Galego, on St. Helena's Day, 1502. In 1513 it became the voluntary abode of Fernandez Lopez, a Portuguese nobleman, on returning in disgrace from India, who, being left here with a few servants and some useful animals, assiduously cultivated its resources. In a few years he was recalled to his country, and imparted the advantages of St. Helena to the

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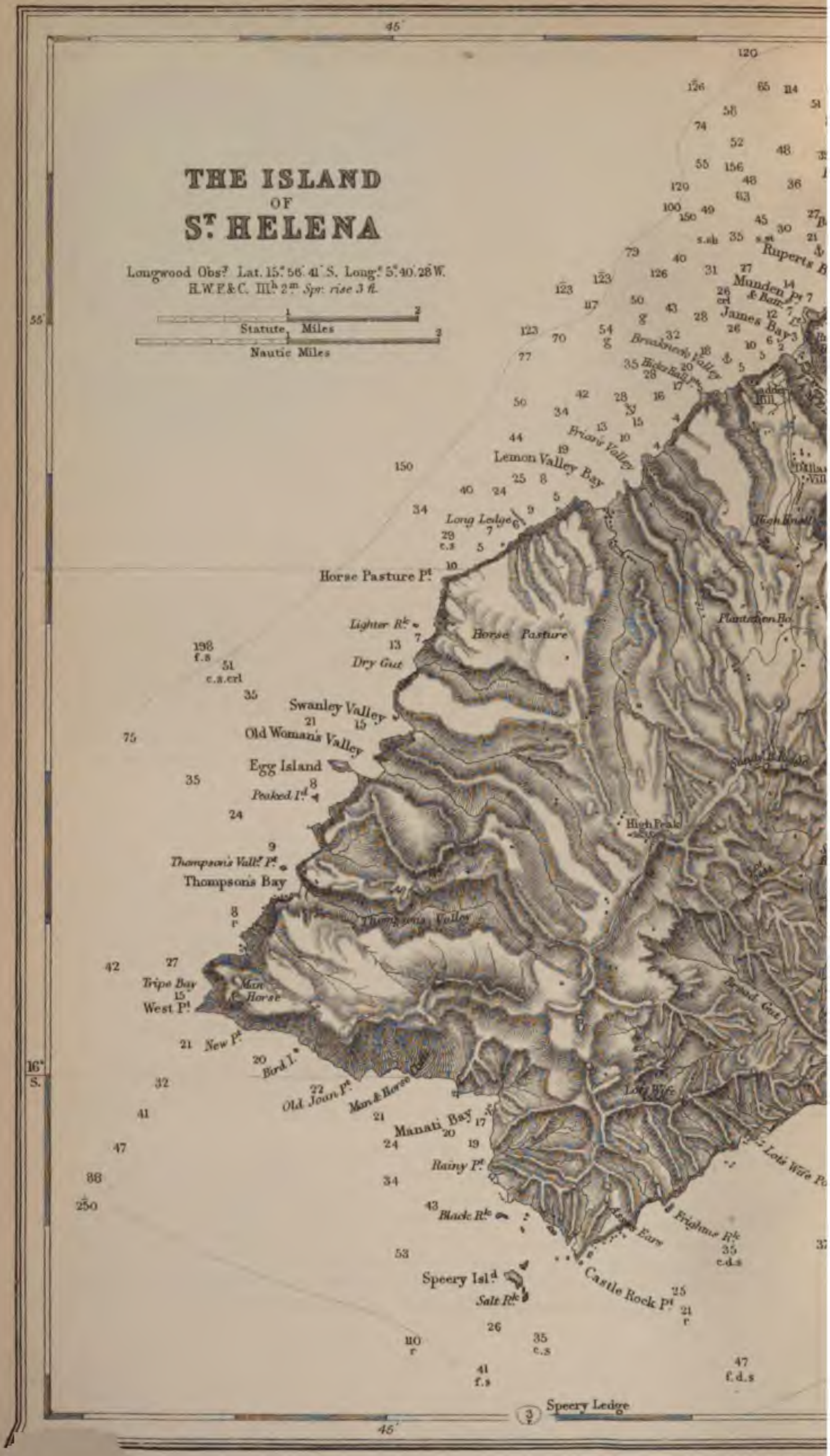
* We have availed ourselves of a translation of a graphic account of a visit to St. Helena, by Captain Fokkens, of the Dutch marine, in 1849, as detailed in the invaluable *Verhandelingen en Berigten*, by the Chevaliers G. A. Tindal and J. Swart, Amsterdam, 1850.

"A Guide to St. Helena, Descriptive and Historical, with a visit to Longwood and Napoleon's Tomb," St. Helena, 1851, contains a great amount of useful information.

"St. Helena," it is said, "is famous for an inexhaustible supply of fresh water, without a river; for an indigenous 'wire-bird,' with legs like a sandpiper; for a splendid display of prickly pears; an iron-bound coast; a ladder 600 feet high, the high road to the upper regions: a time-ball, like a Dutch cheese on a May-pole; for the possession of Lot and his wife; a petrified friar; for extinct volcanoes which cannot be found; the grave of Napoleon; and for not having had a wreck on its shores time out of mind."



THE ISLAND
OF
Sᵀ HELENA

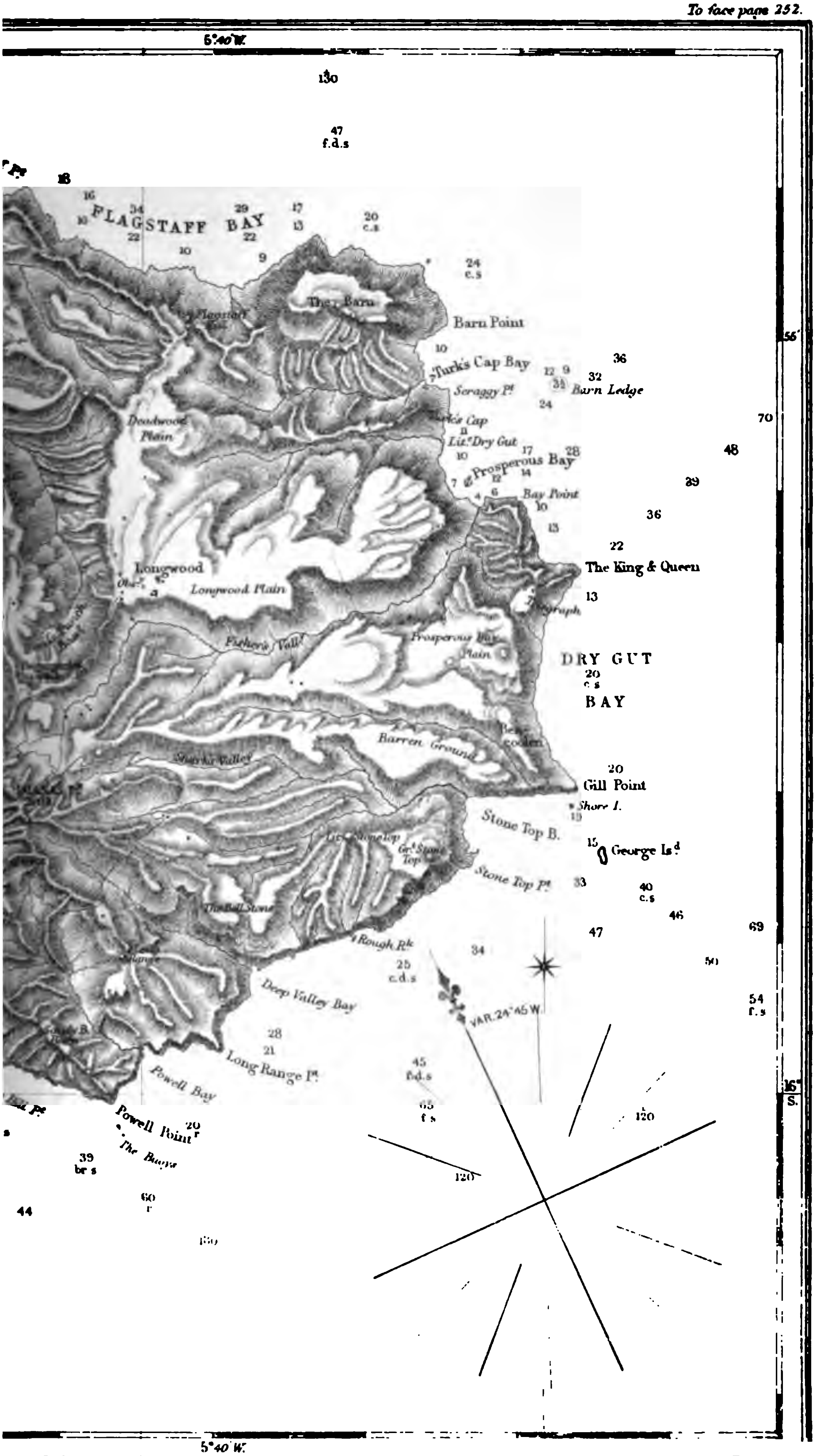
Longwood Obsʸ. Lat. 15° 56′ 41″ S. Longᵉ 5° 40′ 28″ W.
H.W.F.&C. IIIʰ 2ᵐ *Spr: rise 3 ft.*

Statute Miles

Nautic Miles

R. H. LAUR

To face page 252.



EET, LONDON

East India trade. Thomas Cavendish, in his famous cruise around the globe, visited the island in 1588, and found, as he said, "Divers handsome buildings and houses, a church tiled and whitened, very fair, a causey made up with stones, reaching into a valley by the seaside." This valley he describes as the "fairest and largest low spot in all the island, and is exceedingly sweet and pleasant, and planted in every place either with fruit or with herbs."

For some time after the departure of Lopez, the island does not appear to have been regularly inhabited; but in 1640 the Dutch attempted to establish a settlement here, which they relinquished, in 1651, to the English East India Company; and to this company the entire possession and sovereignty of the island were granted by charter of Charles II., 3rd of April, 1661. At the close of 1672, the Dutch, by the treachery of one of the inhabitants, again obtained possession; but it was soon re-captured by three British ships, under the command of Capt. Richard Munden. The island thus relapsed by conquest to the crown, but was re-granted by the King to the East India Company. The second charter, dated the 16th of December, 1673, constituted the governor and company the true and absolute lords and proprietors of the island, with full legislative power, but, as near as may be, agreeably to the laws of England. In 1836, St. Helena was transferred from the East India Company to the Crown for £100,000.

The island, when first descried from the *northward*, appears like one vast rock or castle, surrounded by the ocean; the coasts being generally high, rugged, and precipitous. On advancing, the prospect gradually improves; the mountains appear in varied hues, and then assume the verdant tint which distinguishes their summits. The rocky coasts will now present a striking contrast to the green hills and valleys of the interior. The town will next be seen, seated in a narrow valley between the mountains, with the batteries, the church, and the white houses, interspersed with trees, constituting altogether a picturesque and animating scene.

It is surrounded by a wall of precipitous cliffs, from 1,000 to 1,800 ft. in height, intersected by chasms serving as an outlet for the watercourses of the island, and terminating in small coves more or less exposed to the fury of the waves. There are no less than twenty-three of these openings around the coast; but landing is almost impracticable, except on the north-western or leeward side, and at Prosperous and Sandy Bays to windward, and even then only in favourable weather.

The most singular phenomenon connected with this part of the ocean is the setting in of very heavy continuous swells, called "rollers," from the N.N.W., particularly during the month of February, when the waves burst on the leeward shore with astonishing grandeur and impetuosity. During their continuance landing is extremely dangerous, and can only be effected by watching the intervals between the swells. In February, 1846, thirteen vessels, moored at half a mile from shore, were totally wrecked, and the wharves and batteries suffered considerable damage.

The island is divided into two unequal parts by a lofty ridge of mountains from 2,000 to 2,700 ft. above the level of the sea, extending in a semi-circular sweep from S.W. Point to Stone Top Point at the S.E. The principal eminences on this range are—High Peak, 2,635 ft.; Diana's Peak, 2,704 ft.; Actæon's Mount, 2,700 ft.; Little Stone Top, 2,380 ft.—(*Major E. Palmer.*) Numerous spurs branch off from this ridge: those to the North and N.E. decreasing in altitude, but increasing in extent, as they approach the sea, where they terminate in precipitous cliffs, and form the boundaries of the deep valleys debouching on the coast. The spurs from the S.W. of the ridge are suddenly broken about 1½ mile from their commencement, the land which they originally supported having subsided, leaving but a wreck of the original formation, with here and there towering fragments of basalt, like the buttresses of a gigantic ruin. The appearance of this part of the island is magnificent in the extreme; and to a spectator on the ride above presents a variety of form and richness of colour baffling description. Every attention has been directed to the proper delineation of this district in the map, and to resolve the apparent chaos into a system of unity.

The island appears to have suffered at different periods from the effect of volcanoes and earthquakes. General Beatson supposes that it is the shattered remains of an ancient continent, connected in former ages with the other rocks of the Southern Atlantic. The district of flat country, comprising the plains of Longwood and Deadwood to the East of the island, would seem to support this theory, particularly as an indigenous tree (*Conyza gummifera*) which grows here is also found on Tristan d'Acunha. The remains of a vast crater are (*vide* Seale's Geognosy) to be traced between Flagstaff Hill and Barn Rock, N.E. of Longwood; but I did not observe any other formation in the island to answer the description of a crater. Limestone is found in different parts of the island, viz., Rupert's Bay, Sugar-loaf Point, and Potato Bay, that from the last-named place being of excellent quality. Gypsum is found near Prosperous Bay. Carnelian in Turk's Cap Bay. The honey-combed (amygdaloidal) basalt and red tufa afford excellent material. A layer of fossil shells (univalves) has been discovered near Flagstaff Hill, 2,000 ft. above the sea.—*Major E. Palmer, R.A.*

Off the S.E. end of the island are two pointed rocks standing high out of water, the outermost of which is called George Island, and the inner one Shore Island, or the Column of Hercules. Close off the southern Cape Castle Rock Point are those craggy rocks called the Needles, or Speery Island, Robert and Salt Rocks; and 2 miles to the northward of the western point of the island, close to the shore, are two more, Buoys Peaked and Egg Islands. They are all barren rocks, the largest of which is not 300 yards in circumference.

Approaching the island from the S.E., the land appears to slope gradually from the middle of it to the northward, terminating abruptly in Barn Point, the N.E. point, which rises to a ridge called the Barn, the highest point of which is the Haystack, 200 ft. high. Beyond this Sugar-loaf Point is seen, the northern extreme of the island, and near which is the well-known pinnacle-shaped mountain called the Sugar-loaf, 1,927 ft. above the sea. At the foot of this mountain are the batteries, a short distance apart from each other, called Butter-milk Above Bank, and Beneath Bank batteries, about 100 and 200 ft. above the sea.

Shipmasters must be careful not to get to leeward of the road, but to make the island from the eastward, keeping Sugar-loaf Point, when rounding it, close on board.

Formerly, all vessels on passing this point sent a boat to the first-named battery to give the name of the ship and the object of her visit, but this has been discontinued. On that account our seamen gave it the name of "Pry Corner." About 1½ mile S.W. of this point is Munden Point, on the S.W. of Rupert Bay, which forms the eastern boundary of James Bay, in which, at the entrance of a small valley, James Town is situated; the best anchorage off it is in from 12 to 20 fathoms. The western point of the bay is formed by a steep perpendicular hill called Ladder Hill, about 800 ft. above the sea. The distance between these two points is about 3 cables' lengths. Between Pry Corner and Munden Point is Rupert Vailey, where landing can be effected.

View of St. Helena, from the Road.

The only LANDING PLACES are at *Rupert's* and *James's* or *Chapel Valleys*. In Rupert's Valley, towards the sea, stands a strong battery; but the valley is not habitable, because it has no water. In the entrance of James Valley stands *James Town*, which is defined by a fine line of batteries, and flanked by a high inaccessible battery upon the rocks called Munden's, close under which all ships must pass that come to an anchor before the town. As soon as Munden Point is passed, James Town appears suddenly between rocky precipices 1,000 ft. high. The white buildings and church, with the green foliage of the neighbourhood, give a pleasing effect to the scene, improved by contrast with the adjacent craft. Immediately behind the water battery, and in front of the town, stands the castle, distinguished by a flagstaff, and near to it on the right is another large house called the "Times Office." In the first are the offices of the government officials, the other is the dwelling of the harbour master. The Times Office is provided with a mast, from which at a stated time a white time-ball falls in sight of all the vessels in the roadstead, as presently described. The principal street consists of neat and well-constructed houses, and divides into two others; one on the East, leading to the country in that direction, and the other to the upper part of the valley, where the barracks, the new garden, and the hospital are situated. In the western street are a number of shops; but the houses here are very inferior to those in the lower street, where the principal inhabitants reside. There is a Commercial Code Signal Station on the island.

The water that supplies the garrison and shipping is conveyed by leaden pipes from a spring in the valley, called Chubb's Spring, distant more than a mile from the sea. These pipes lead the water to the jetty, where there are two cranes for the use of boats in loading with goods or watercasks, or for receiving stores from the shipping. The water is of the purest quality, and in great plenty. In a moderate season, six hogsheads are yielded every minute, and shipping may be supplied with 300 tuns every twenty-four hours.

On the right or western side the valley is entered from the interior by the steep promontory called *Ladder Hill*, 800 ft. above the sea; the zig-zag road upon which, 9 ft. in breadth, has a wall on the side next to the precipice, and is very easy of ascent. On the left of the valley, the carriage road, called *Side Path*, is the avenue to the interior of the island eastward. This road, which has been made with great labour and difficulty, goes with an easy ascent transversely to the level above, whence the prospect is striking and delightful; from a sterile brown and barren rock you view the most lively verdure, beautiful lawns, with sheep and cattle feeding in different places, interspersed with small houses, which have generally a large inclosure laid into gardens. This view is terminated by a prospect of the sea, or by high rocks, apparently heaped one upon another to a stupendous height. The plain called *Longwood*, toward the eastern side of the island, contains the greatest quantity of level ground. A considerable space on it is planted with trees, but it is deficient in water. This plain, 1,762 ft. high, forms another point of view. The scenery is here enlivened by a small winding stream, which, falling from the heights into the valley, makes a delightful cascade. Upon the edges of the stream water-cresses are often plentiful. At the S.W. end of this plain is Longwood House, Napoleon's residence, and also the Magnetic Observatory.

The botany of St. Helena is interesting, affording nearly sixty species of indigenous plants, the most remarkable of which are—the *Island Ebony* (Dombeya melanoxylon), now nearly extinct, but found in the shape of gnarled and broken trunks on the hills to the South; the *Red Wood* (Dombeya erythroxylon) is also almost extinct; *String Wood* (Acalypha rubra); the *St. Helena Tea* (Beatsonia portulacifolia) is only found on the summit of Sandy Bay Barn and the flanks of High Knoll; also ferns of great beauty. Trees and shrubs from all parts of the world have been collected in the gardens of Plantation House, where the oak, bamboo, aloe, pine, &c., flourish together. The main ridge of the island is covered with a luxuriant vegetation of tree ferns and cabbage wood (Solidago cuneifolia) nourished by a constant moisture.

The rocky islets round the coast swarm with sea-birds, particularly the beautiful white bird (Procellaria nivosa); and the man-of-war bird and tropic bird are to be seen wheeling their flight high above the lofty pinnacles of the island.

The shores abound with mackerel and albacore, the principal food of the poorer inhabitants. Sharks of great size and voracity are now and then captured; and during the month of August shoals of whales (black fish) are frequently seen, affording many an animated chase to the boats of the American whale-ships.

Cattle are constantly imported from the Cape of Good Hope, although the island is capable of supporting a large number. The quantity of pasturage is 7,652 acres. The sheep and beasts are in no respect degenerated by change of climate. In some situations rabbits abound; pheasants and partridges are numerous, and the gardens are enlivened by the notes of the canary bird. Fish, to the extent of seventy species, have been found on the coast; among these, mackerel is peculiarly abundant, but some are very unwholesome. The shell-fish include turtle, oysters, and two species of lobster. Sea fowl deposit immense quantities of eggs around the island, which are collected in the fall of the year, and constitute an agreeable article of food.

No snakes or reptiles, except a few centipedes and scorpions, are found on the island. Rats, however, are a terrible plague, and nothing is safe from their depredations.

Of the climate under which such products are found, but little need be said. The thermometer is seldom higher than 80°, and the summer not so hot as in England. The winter is also milder, commonly ranging between 55° and 56°, a temperature in which the vegetation of leaves proceeds with more equality, perhaps, than any other. Thunder is seldom heard; but, with a sultry atmosphere, lightning is not unfrequently seen. There have been seasons of drought, wherein the cattle have perished from want of water; but, in general, rain is experienced in all seasons, particularly in July, August, and September, or the summer months of the northern hemisphere. Sir Joseph Banks has said that "every month has its share: there are more rainy days in February, however, than in any other period; and cloudy days throughout the year exceed in number, almost two to one, those in which the rays of the sun fall upon the earth without interruption, and scorch the vegetation."

On the ridge above Ladder Hill is the Observatory, established by the East India Company, under the superintendence of Capt. Johnson, of the St. Helena Artillery; but it was discontinued at the commencement of the present government of the island.

The practice of discharging rockets for rating the chronometers of vessels touching here has also been discontinued, and a time-ball has been substituted; this ball was originally hoisted at the Observatory, as shown in the margin; but as the Observatory is no longer in use, the ball has been removed from the hill to the town, at the Time Office, on the West side of the lines, James Town Valley, and is in charge of the master-attendant, whose attention to it is unremitting.

Observatory, on which the time-ball was formerly exhibited.

The ball drops at mean noon, St. Helena time, for the benefit of the inhabitants, and at 1 p.m. for the advantage of the shipping. The ball is hoisted half-mast high, five minutes before the time, and at two minutes before to the mast-head.

The official notice, dated St. Helena, 21st of January, 1834, states that—

To prevent mistakes, a *white ball*, hoisted upon a staff, will denote the time as follows: the ball will be hoisted half-mast at *five* minutes, and close up at *two* minutes before *twelve o'clock.*

At the instant of the *mean time*, at noon, at St. Helena, the ball will drop from the top of the staff, when the gun will be fired at High Knoll.

The signal will be repeated at 1^h, at the instant of *Greenwich mean time* for the benefit of the shipping.

A ship wishing to correct her chronometers, and arriving after 1 p.m., and not likely to remain the twenty-four hours, may hoist the *Blue Peter* at the main-top-gallant mast-head, when the same method will be adopted at the next ensuing hour after the signal. Foreign ships should substitute their ensign for the Blue Peter.

Should there be any uncertainty, and the ship wishes to have the signal repeated, she will dip the flag, and rehoist it on observing the ball half-mast. The ball will again drop at the ensuing quarter past the last hour.

Ships concealed from a view of the signal station will attend to the repeating ball at the flagstaff on Ladder Hill, which is in sight of the whole anchorage, and in neither case is any allowance to be made for loss of time, since the astronomer will make the calculation of the few tenths required. A charge of 5*s*. is made on shipping for the use of the time-ball. The signals are not made on Sunday.

The late Admiral FitzRoy, in his chronometric expedition, made the situation of a spot close to high water mark on the meridian of the Observatory, lat. 15° 55′ 15″, long. 5° 42′ 45″ W.

The objects of interest at St. Helena are Plantation House, the residence of the Governor; Sandy Ridge; and Napoleon's Grave. The last is about 4 miles from James Town, and the route to it affords the best opportunity of seeing the finest scenery of the island, as it is in the direct route to Diana's Ridge and to Longwood. It lies in a valley, having a little fount of water, moss-grown and beset with brake and fern. The valley is adorned with wild flowers, among which the roses and geraniums bloom throughout the year, and mingle their delicious perfume. This was Napoleon's favourite resort, and here his remains were deposited.

Napoleon Bonaparte, "who bestrode the majestic world like a colossus," arrived at St. Helena, an exile prisoner, on the 13th of October, 1815, and on May 5th, 1821, he died at Longwood, a villa 6 miles from James Town, in the sixth year of his exile, and the fifty-second of his age. On the 4th the island was swept by a most tremendous storm, which tore up all the trees by the roots. About six in the evening, Napoleon having pronounced "*Tête d'Armée*," passed for ever from the dreams of battle. He was buried, as above stated, and his grave was for nineteen years the principal object of interest in this, his island tomb. On May 5th, 1840, the anniversary of his death, his body was formally demanded of the British Government, and on October 15th, 1840, it was removed from its resting place, and conveyed to the Hotel of the Invalides, in Paris.

The land in Napoleon's Vale, where his tomb was situated, about 23 acres, and the house and land at Longwood, about 3 acres, were purchased by the Government in 1858, at a cost of £1,600 for the tomb, and £3,500 for the house, and conveyed to the Emperor of the French and his heirs in perpetuity. A French officer is appointed as guardian of them, and a copy of the equestrian statue at Cherbourg was to be sent to the island.

The mail steamers from England call here about once a month, and those homeward bound twice a month. Fresh water can be delivered on board vessels in the roads by sailing tanks.

Harbour Regulations.

Art. 1. The commanders of all vessels are obliged to make over to the collector a manifest of freights for St. Helena, besides a list of passengers and luggage, the goods coming from Great Britain and Ireland to be opened in the entrepot, and also to give notice before they unload. A penalty of £100 is inflicted in neglect of it.

Art. 2 No boat or other vessel, except the pratique boat, shall be allowed alongside a ship newly arrived before a communication has been allowed by the medical inspector, and which will be made known by hoisting a white flag on the main-top-gallant mast-head.

Art. 3. Every ship displaying a yellow flag at the fore-top is in quarantine.

Art. 4. Every commander of a ship must give twenty-four hours' notice to the Secretary of Colonies before his departure, but if he wishes to leave again within the twenty-four hours after arrival, immediate notice must be given; neither may he take any persons whatever off the island without the knowledge of his Excellency the Governor, or Colonial Secretary.

Art. 5. No boat is permitted to make fast to the buoy or buoy rope, neither to the crane nor to the waterman's place while any other boat is unloading, loading, or letting in water. Neither shall any boat so loading or unloading be allowed to remain over a reasonable time.

Art. 6. No boat shall be allowed to remain fast to the steps longer than absolutely necessary, but remain a short distance off in order not to prevent other boats from landing.

Art. 7. No gunpowder is allowed to be landed without four hours' notice being given to the Officer of Artillery, or Harbour Master.

Art. 8. No boat whatever may land any person or luggage from any ship, except H.B.M. ships, on any other part of the island than James Town without having special leave.

Art. 9. Masters of ships to give twenty-four hours' notice to the Colonial Secretary of any person about to leave the island; provided that if it shall not be such Master's intention to remain twenty-four hours after application for a passage, then immediately after such application from any person about to leave, he is forthwith to give such notice as aforesaid, and which such last-mentioned notice must be given within three hours before his departure; and not to take any person from the island against the order of the Governor, or the Colonial Secretary.

Art. 10. Every person visiting a vessel on board of which there is an infectious disease, must remain on board until such disease has left, or go with the ship to such place as the Governor may think fit.

Art. 11. No fish may be landed at the innermost steps, nor any offal left behind at the landing-place, neither is any bathing allowed in the harbour, nor bones of large fish or carrion to be thrown into the sea within a quarter of a mile of the shore.

Art. 12. Boat hire:—

	£	s.	d.
For one person to or from on board - - - - -	0	1	0
For more than one, each - - - - - - - -	0	0	6
For every letter, or package under 25 lbs. (English) - -	0	1	0
For every package above 25 lbs. and under 100 lbs. - -	0	1	6
For every additional 100 lbs. - - - - - -	0	0	6
For every hour detained alongside a vessel - - - -	0	1	0

Art. 13. Licensed boats must not refuse between sunrise and sunset to take any one on board a vessel at anchor, neither refuse to wait alongside when requested.

Art. 14. All vessels in quarantine must be moored on the West side of the harbour, under the surveillance of the Harbour Master.

Art. 15. Commanders of vessels who come for water must send in a written request, signed by themselves, to the office of the Harbour Master, specifying the quantity required. The time ball at James Town falls at 12^h, as at the island, and at 1^h of Greenwich mean time; lat. 15° 55′ 25″ S., long. 5° 42′ 30″ W., or 22^m 50^s in time. For the information of commanders and passengers, it may be observed that the gates of the town are closed, and the bridges drawn up at 9 p.m., and remain so until the morning gun fire. Those who wish to return on board must leave the town before this takes place.

By an Ordinance of March 1st, 1882, St. Helena is declared a *Free Port*, the anchoring fee of 1*d*. per ton and pratique fee of one guinea being both abolished. A *duty* of 6*s*. per ton is levied on water supplied to shipping. On all cargo landed or shipped, a duty of 1*s*. per ton is levied, besides import duties on cattle, sheep, beer, and wine.

DIRECTIONS.—The best routes from Europe to St. Helena have been described on pages 194—5.

As *James Town* is situated in the most leeward part of the island, ships, in coming in, are obliged to keep close under the land. Another disadvantage is that of eddy winds, calms, and violent gusts, which lay them almost on their broadsides.

A ship bound to this island must run down along the North side of it, within a cable's length of Sugarloaf Point, and afterwards keep the shore close on board; and likewise within a cable's length: there is no danger, and it is bold and steep-to. On the West part of Sugarloaf Point stands a small fort; and a little to the southward of it is Rupert's Valley; the next point, to the southward of the valley, is Munden Point, which, like all the rest, must be kept moderately close on board; you then come to James Valley, off which is the place of anchoring. As the anchorage is generally crowded with shipping, no marks would be of use; a berth must be chosen in the most convenient position. The bank runs out to the westward, off the fort, about 1½ mile, and deepens gradually from 7 fathoms near the shore to 30 and 35 for about 1¼ mile, when it deepens suddenly to 60 fathoms, and then no soundings. The bottom in the road is coarse sand and gravel. You will find no soundings until you come abreast of Rupert's Valley, where there is 18 to 20 fathoms. A small *fixed bright* light is usually shown at the landing-place in James Bay.

One watering place is just without James Fort, where there is a crane for striking the casks into the boats; the other is at Lemon Valley, where there is the best water, and you may fill the casks in your boats with a hose.

Although the anchorage is well sheltered and easy of access, the surf is at times so high that no boats can land for several days together. These surfs are most prevalent in the months of January and February, and many lives have been lost in consequence of boats being upset by them. During this time the weather is fine, the wind light, and no *obvious* cause to produce so extraordinary a phenomenon as these surfs present. The spray commonly rises to the height of 50 or 60 ft., produced by a wave from the sea, which at the time appears to be in a perfectly quiescent state.

Barn Ledge, on the N.E. side of the island, represented in the particular plan on the Chart, is about 1½ cable in circuit, and has generally a heavy ground swell upon it, with from 12 to 6 fathoms, and several pointed rocks of 25, 21, and 20 ft. From the Ledge, Barn Point bears N.W. ¾ N. about 8½ cables; Turk's Cap in one with Gregory Battery, W. by N., distant nearly 1 mile. To pass eastward of it, large ships should keep George Island open of King and Queen Point until Sugarloaf Point is open northward of Barn Point. This leads clear of the Barn Ledge, between which and the shore there is 24 and 20 fathoms, in a channel more than half a mile wide. Close to the Ledge, on the outside, there is 32 and 34 fathoms.

There is also a ledge off the South Point of St. Helena, at rather more than a mile. This is the *Speery Ledge*, a reef 2 cables' lengths in circuit, with depths of 15 to 10 fathoms, and pointed rocks of 24 to 18 ft. A heavy ground swell is frequently on it. From the ledge, Speery Island bears N. by E. ¾ E.; the North Black Rock, N. by E. ½ E., nearly touching Speery Rock; the S.W. or Man and Horse Point, about N. by W.; Long Range Point, E. ½ N.

To avoid the Speery Ledge, if sailing along the S.E. side of the island to the westward, keep Shore Rock open of Long Range Point till the northernmost of the Black Rocks opens to the westward of Speery Rock, or West Point bears North; then you may haul up for the S.W. part of the island. About a mile W. by N. of Speery Ledge is a patch of 10 fathoms, rocky bottom; between Speery Rock and the ledge there is 24, 26, and 35 fathoms, and the bank of soundings extends 2 miles without the ledge, in a South and S.S.W. direction, with 50 and 58 fathoms, fine sand, on its outer border.

10. ISLES OF TRISTAN DA CUNHA.

These isles are three in number, forming a triangle, of which the largest isle, *Tristan*, is the N.E. point. The other two isles were named by the French, in 1767; the westernmost, *Inaccessible Island*, and the smallest, or southernmost, *Nightingale Island*. The group appears to have been discovered by the Portuguese in their earlier navigations, and was farther explored and described by the Dutch in 1643, and by the French in 1767.

At present it is the domain of an interesting community of English people, whose manners, simplicity, and excellence of character remind us strongly of the somewhat similarly-placed family upon Pitcairn Island in the Pacific, the retreat of the mutineers of the *Bounty*. As we are able to trace from successive visitors the progress of these isolated people, we give such extracts here as may cause the passing mariner to view with greater interest these children of nature.

The situation of these islands is important to our outward-bound Indiamen, and its correct position, which we now give, will afford an excellent means of rating chronometers.

According to Captain H. M. Denham, of H.M.S. *Herald*, who touched here on his route to the Pacific, in November, 1852, as presently related, the N.W. extremity, which is near the settlement, lies in lat. 37° 2′ 48″ S., long. 12° 18′ 39″ W.

M. D'Etchevery gives the following account of the French exploration:—"September 9th, 1767, at 5 a.m., I made the three islands of *Tristan da Cunha*, bearing East and E. by N., distance about 10 or 12 leagues; the wind then westerly, I steered East to examine the middle island (*Inaccessible*), which is the westernmost; and being at noon abreast the N.E. point, I sounded at a mile from the shore, with the middle of the island bearing West, where I found 20 fathoms, black sand, and some reddish stones. This island is high, flat at top, and may be seen 15 or 16 leagues off: it is about 2 leagues in circuit, and appears barren, steep, and inaccessible; some scattered shrubs only are to be seen on it; I perceived no danger near it, but a rock, like a boat under sail, is visible at the S.E. point."

An approach to the islands may be generally known by the floating sea-weeds, seen on the water, which are sometimes met with far out at sea.

INACCESSIBLE ISLAND presents a high bluff, of forbidding appearance, which may be seen at the distance of 36 to 42 miles. *Nightingale Island*, irregular, with a hollow in the middle, and two small rocky islets off its northern side, is descried at the distance of 21 to 24 miles.

" The *Blenden Hall*, Captain Greig, from London to Bombay, was totally lost on Inaccessible Island, on the 23rd of July, 1821. The commander, officers, and passengers, got safe on shore, but eight of the crew perished. They remained on the island, exposed to cold and rain, until the 8th of November, on which day the carpenter and three or four of the crew embarked in a small punt, made out of the wreck with surgical instruments which were thrown ashore, and reached Tristan da Cunha, where they procured two whale boats, and brought those that remained on Inaccessible Island away. On the 9th of January a brig from Brasil put into Tristan da Cunha for water, and took them all away, and on the 18th of January they all arrived safe at the Cape. During the time they were on the island, they had no food but penguins and their eggs. Out of some bales of cloth washed on shore, they made tents; an iron buoy, sawn in two, was their only cooking utensil. They were for four days exposed to heavy rains and intense cold, before they could procure fire. The ladies and passengers suffered severely, nothing being saved but the clothes they wore, the ship going to pieces two hours after she struck."

TRISTAN.—The island is discoverable at the distance of 75 miles. Toward the northern part there is an elevation of 1,000 ft. perpendicular from the sea; then commences a level or table, extending to the centre of the island: and above that rises a conical mountain, not very dissimilar to the Peak of Tenerife, as seen from the Bay of Santa Cruz. Having previously examined the shore, and taken soundings in boats, the *Lion* stood in, and anchored in the evening, on the North side, in 30 fathoms of water. When the ship was at anchor, she was overshadowed by the dark mass of that portion of the island, whose sides seem to rise like a moss-grown wall immediately from the ocean. Here a sudden gust of wind started the anchor, and the ship for safety put to sea. The sword-fish, whales of every species, sea lions and seals, penguins and albatrosses, appeared to frequent the coast.

To the log book and notes of Captain John Patten, of the ship *Industry*, we are indebted for the following information. Capt. Patten was a temporary inhabitant, from August to April, of the largest of the islands, where he remained with part of his crew, collecting seal skins. He says, they all consist of very high land, with clear open passages between them. Their shores are in general bold, and are exempt from shoals or other dangers to navigation, except a high reef of rocks or rocky islets, off the South end of *Inaccessible*, the smallest island.

The current sets to the N.E. There is a regular tide, the water rising from 8 to 10 ft. While Captain Patten was there, the prevailing winds were from the northward and westward; the easterly and southerly winds blowing but seldom, and scarcely ever longer than twenty-four hours at a time. It generally blows fresh, and frequently very hard, from the N.W.: and when a gale came on, it was generally preceded by a very heavy sea, rolling in sometimes twelve, and sometimes twenty-four hours before the wind rose. The weather is very subject to be thick and hazy, attended with much rain. The summer months are warm, but the cold in winter is very severe.

There is a bay on the N.W side of the large island, which, however, is open and exposed. It has a fine beach of black sand where the boat was hauled up. There are two falls of excellent water, affording an abundant supply, sufficient for the wants of a large fleet; and from one of these cascades the water casks might be filled by means of a long hose, without moving them from the boats.

In the seven months that Captain Patten was on shore at Tristan da Cunha he obtained 3,600 seal skins, and could, he says, have loaded a large ship with oil in three weeks. Both the sea elephants and the sea lions, as well as the seals, afford large quantities of oil; but as their business was to collect skins for the China market, they killed such seals only as suited their purposes. September he reckoned to be the best month for making oil at these islands.

The middle of the large island rises in the shape of a sugarloaf, and is very much elevated. Trees grow halfway up; but, higher up, the mountain consists of bare and rugged rocks, frequently hidden by the clouds, and the summit is covered with snow during the greater part of the year. No snow, however, was observed to fall on the coast. There is a considerable extent of level land between the foot of the mountain and the shore.

The height of its summit was found to be about 8,326 ft. above the level of the sea. Three Americans were there, who proposed to remain for a few years, in order to prepare seal skins and oil, for sale to vessels that might touch there. The interior appeared to abound with goats and wild hogs; and to be formed, like St. Helena, of abrupt hilly ridges, with chasms or deep valleys between them, probably of volcanic origin.

On the 4th of February, 1791, Jonathan Lambert, one of the Americans above mentioned, by a curious and singular edict, declared himself sovereign proprietor of these islands. In a short time he cleared about 50 acres of land, and planted various kinds of seed, some of which, as well as the coffee tree and sugar-cane, were furnished by the American minister at Rio Janeiro. The seed sprang up, appeared very promising, and the general aspect was that of a valuable and important settlement. The whole was, however, abandoned, and formal possession afterwards taken in the name of the British Government, by a detachment from the Cape of Good Hope.

An official notice, 30th March, 1817, announced the occupation of the islands by a force from the Cape; stating further, that "there is a good convenience for watering at the principal island."

The island was, however, again evacuated; but, lastly, several families voluntarily went to it, after it was given up as an establishment, entirely independent of control from Government; and in the London papers of April, 1824, there appeared the following statement. "The Island of Tristan da Cunha has now upon it, living in great happiness, twenty-two men and three women. The *Berwick*, Captain Jeffery, from London to Van Diemen's Land, sent her boat ashore on the 25th of March, 1823. The sailors were surprised at finding an Englishman, of the name of Glass, formerly a corporal in the artillery, and the rest of the above-mentioned population. Glass gave a favourable account of the island, which is only 9 miles in diameter.

Captain James Liddell, of the ship *Wellington*, called here on her way to Madras, 2nd December, 1835. He says—

"A large increase of the inhabitants had taken place since our last visit in 1831, the number now reaching forty-one, exclusive of Glass's eldest son, absent in a whaler. Though they have frequent intercourse with American whalers, I was surprised to find that they had seen no free trader since we called four years ago. As the poor people are entirely dependent on ships for supplies of clothes, and many other necessaries, it may be imagined with what joy an Indiaman full of passengers is welcomed.

"On this, as on former occasions, my passengers, especially the ladies, were exceedingly liberal in their presents of wearing apparel, blankets, books, &c.; and I had great pleasure in adding to these valuable supplies a fine calf, with wheat, barley, and oats, for seed, and a variety of stores. Their stock consists of fifty head of cattle, seventy-five sheep (which at present thrive indifferently), and a large quantity of pigs and poultry. The weather being very fine, all my passengers (except the ladies) were gratified with a trip on shore, when the Rev. J. Applegate, of the established church, took advantage of the opportunity to baptize twenty-nine persons, from the age of a few months to seventeen years, after an affecting address to all the assembled inhabitants. This was the first time they had ever seen a clergyman; and a baptismal register was now left with them. In the eventful history of their little community, our visit will no doubt form a very important era.

"In offering these few details to the perusal of your numerous readers, I am actuated by a hope that some commanders of Indiamen may be induced to call at the island, which lies very nearly in the best route to India, when circumstances permit, as their visits will not fail to confer an incalculable benefit on the poor inhabitants."

Mr. Glass has cut a trench from the run of water that forms the "Cascade," from which a hose is attached, and fills the water in the cove. However, if there be any swell running, the best way is to raft it, as there is no inconvenience arising from the seaweed, beyond an oar fouling occasionally.[*] Observe, also, that the current generally sets to the E.N.E. The ship ought to keep the Cascade to the eastward of South, in order to enable the boat to fetch the cove with the raft (supposing the wind westerly); and when the boat is returning, and has gained a sufficient offing, to run down inside of her, and receive the raft with the head off-shore. The people on the island will cheerfully render all the assistance in their power.

The following extracts from Captain H. M. Denham's notes on his visit in H.M.S. *Herald* are interesting. November 11th, 1852. It was 2 p.m. before we approached the island sufficiently near to pick up a boat which we had observed to put off from the S.W. point. From the crew, which consisted of two Englishmen, one Dutchman, and one American, we learnt that the little settlement of nine families was situated on the N.W. point of the island. These fine, healthy, and robust fellows, clad and speaking as Englishmen, made us feel that they came from an island of Great Britain; even the Dutchman had become English.

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[*] It is desirable to know where this seaweed originates, and how it is subsequently dispersed in the ocean. On the 1st of March, 1823, in lat. 36° 33′ S., long. 6° 55′ W., Captain R. Coulter, in the ship *Westmoreland*, passed several patches of it with tangle; and next day, in lat. 36° 54′, long. 4° 27′ W., another quantity of the same, with a large flock of white sea birds. (Sea Pigeons ?) See the descriptions of *Lennon's Reef* and *Robson's Reef*, hereafter.

We were now lying-to, at 2½ miles off the stupendous cliffs, but not without anxiety lest the heavy swell should be accompanied with rollers, while the ship should lie in the eddy winds, or calms occasioned by those cliffs, which hoist a vessel at this distance round and round upon her heel, driving and drawing her under the cliff, where no bottom can be calculated upon for an anchor to avoid destruction.

A N.W. wind placed us rather to leeward of the settlement on the next morning, and rendered the landing-place a lee shore. Nevertheless, being a moderate breeze, and looking for advice and assistance from our friends of last evening, who encouraged our project of landing, this being their finest (young summer) season, we stood in.

The first cast of the lead while standing in was 46 fathoms, sand, at 1½ mile off shore, abreast of the cottages situated on the tabled tongue of land immediately under the almost perpendicular side of the mountain, which slopes down to the sea from an altitude of 8,300 ft. on all sides of the island, except this flat space which forms the north-western projection of the island.

A heavy forbidding swell rolled us onwards as we left the ship, and directed our boat towards the strip of dark pebbly shore marked by the islanders' whale boat, near the steep roadway which they have cut laterally with the cliff. This only clear spot, as regards boulders, can be hit upon when the islanders' boat may happen to be abreast, by making for the beach about a cable's length to the eastward of the Cascade above the high water mark cliff, which ranges round this table land at from 10 to 100 ft. above the sea level.

Keeping our eyes upon the men on the beach close to their boat, we approached with confidence, looking to them for a sign if we were not right in attempting the surf, which, judging from the undulation we were in, was likely to break fearfully at their feet. At one-third of a mile from the shore, however, we entered among the kelp *(fucus giganteus)*, which destroys the roughness of the water; and, although in the way of the oars, renders landing comparatively safe.

The inhabitants of Tristan da Cunha are all English by association, though not by birth and parentage. The population (1852) amounted to 85 persons, all acknowledging the Church of England communion.

Ships are beginning to visit this island, but nothing should induce the commander of a merchant vessel to anchor, even if she should do so at the depth of 30 fathoms water, 1½ mile off, with the wind off shore. The swell which attends the brief calm preceding the change of the wind on shore (North and N.W.) would be very likely to snap her cable, or jerk her anchor home, and be drifted on the rocky shore. William Glass, who was a corporal here at the time of the British occupation during Napoleon's captivity, is now upwards of

70 years of age, and sorrowfully afflicted with cancer in his under lip and chin, but was able to move about (1852).

It is dangerous to range along the margin of the island nearer than 2 miles, on account of the baffling eddies, which leave a ship in the onset influence of the swell. The settlement bay itself should not be approached within 1¼ mile, or in 40 fathoms water, a limit which is denoted by the sail rock off the western cliff closing with the N.W. extreme of the bay and island, and which it does on the bearing of S.W. ¾ W. The islanders have no name for the north-western point, where our observations were taken at, so it was named *Herald Point.* Keeping the cross marks on of that point, and the erect rocky islet at the western extreme, the white cottage brought S.W. by S. (or the low black cliffy point at the eastern extreme of a black pebbly beach, bearing South), is the best line to run in upon, and which should be preserved whether for sending a boat on shore, while standing off and on, or for anchoring, which a steamer might do with comparative impunity. It must not be forgotten that, except the absolute eddy produced by the projection of the island at half a mile off, the current sets north-eastward. It may also be remarked. that although the peak rears its head 8,000 ft. above the level of the sea, such is the conformation of its slopes, that its apex cannot be seen from the margin of the island, which precludes any vertical angle being measured from the high water mark on the cliffs. The peak is of easy access for barometer measurement, but is generally snow-clad; it was so at the time of this visit, although young summer.

The geographic position of Tristan d'Acunha may now be considered as settled. Its north-western extremity lies in lat. 37° 2′ 48″ S., long. 12° 18′ 39″ W., about one-third nearer to the Cape of Good Hope than to Cape Horn, and nearly on a line drawn between those well-known capes, a position which places it 1,320 miles southward of St. Helena.

Capt. M. S. Nolloth, R.N., who came, with the Bishop of Cape Town, in H.M.S. *Frolic*, 1856, found 71 men, women, and children on the island,—their numbers having been reduced by the departure, in January last, of Mrs. Glass, wife of the late Corporal Glass, with thirteen children and grandchildren, and her son-in-law, with his family of ten, in all twenty-five persons.*

On the 4th of August, 1867, Tristan da Cunha was visited by H.M.S. *Galatea*, with H.R.H. the Duke of Edinburgh on board. A boat came off from the settlement, containing eight men, and steered by a venerable old man, named Peter Green, the oldest surviving colonist. After making a handsome present of clothing and provisions to the value of £110, His Royal Highness, with a number of officers, went ashore in the ship's boats, and stayed about six hours with the colonists. In remembrance of the visit, the village, which previously was without a name, is now named *Edinburgh*.

There were about 500 head of cattle on the island, and 200 sheep, belonging to the different families, all of which were distinguished by their owner's mark.

To give some idea of the quantity of vegetables they produce, we may mention that, deducting what they had required for their own consumption and what they had sold to passing ships, they had still 200 bushels of potatoes remaining from last year's stock. The wild goats—spoken of by all preceding navigators—have entirely disappeared, in a most extraordinary and unaccountable manner, within the last two or three years.

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* "The late Corporal William Glass, who is still always spoken of as 'the Governor,' was evidently much respected, not only by the generation, or rather generations, born

Tristan d'Acunha being too small to maintain a limited number, they seem to consider the Cape as the natural destination of their surplus population, and although distant about 1,500 miles, they speak and think of it as if it were close at hand. In 1857, H.M.S. *Geyser* took thither forty-five of them, together with Mr. Taylor, who had fulfilled his term of five years as resident clergyman. About the same time five families went to the United States. Before this exodus their numbers had risen to 112.

In October, 1873, these islands were visited by H.M.S. *Challenger*, from which visit we obtain the following information.[*]

Landing is easily effected at the settlement in Falmouth Bay, except during northerly winds, and the time of the rollers, which occur in the months of January and February, when it is dangerous. The month of December is considered to have the finest weather. Some of their wants are supplied by American whalers, which frequently call there. A large quantity of potatoes is grown, but no corn. Abundance of fish may be caught by hook and line.

Edinburgh, the settlement, consisting of about a dozen thatched cottages, is scattered over the grassy slope, and behind it one or two ravines afforded a difficult access to the upper terraces and the mountain.

The colony in 1873 consisted of eighty-four souls in fifteen families, the females being slightly in the majority. Most of the settlers are in some way connected with the Cape of Good Hope; some are Americans. The greater number of the women are Mulattoes. Many of the men are engaged in the seal and whale fishery, and as that has now nearly come to an end on their own shores, they are generally employed on board American whalers in the southern seas.

The chief traffic of the islanders is with these American ships, from eight to twelve of which call in passing yearly, to barter manufactured goods and household stuffs for fresh vegetables and potatoes. The fifteen families possess from 500 to 600 head of cattle, and about an equal number of sheep, with pigs and poultry in large numbers. Beef was sold to our messman at 4*d*. a pound, mutton at 4*d*., pork somewhat cheaper, and geese at 5*s*. each, so that the

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around him, but the settlers of various nations who at different periods joined him in his lonely abode. With the ordinary education of a Scotch peasant, he seems to have acquired an ascendancy which was ever exercised for the good of all. By common consent he was the patriarch of the community, being, until the arrival of the Rev. Mr. Taylor, their leader and their priest. He had no absolute authority, having been simply left as a volunteer in charge of the *Julia's* wreck, and of some military stores, when, in 1824, the garrison under Captain (afterwards Major-General) Sir Josias Cloete, was withdrawn. He was a native of Kelso, and died in November, 1853, at the age of sixty-seven years, having resided on the island thirty-nine years. He is buried in front of the settlement of which he was the founder, and an appropriate inscription on a marble stone, sent by his sons from their new home in the United States, marks the spot."—*Capt. M. S. Nolloth, R.N.*

[*] A very full account of these islands will be found in the late Sir C. Wyville Thomson's book, "The Voyage of the *Challenger*," vol. ii, pp. 161—192.

Tristaners, so long as they can command a market—and the number of their occasional visitors is increasing with increasing communication and commerce —cannot be considered in any way ill off.

Inaccessible Island was partially surveyed by the officers of H.M.S. *Challenger*, in 1873. The island is in shape nearly square, its sides being about 2 miles long, and the direction of its diameters being about N.N.E. and S.S.W., and E.S.E. and W.N.W. The highest peak on the island is 1,840 ft. above the level of the sea, and is situated on the West side of the island; the land thence slopes irregularly, terminating on all sides in precipitous cliffs, about 1,140 ft. above the sea.

There is good landing near the southern waterfall, but the cliffs are precipitous, and it is impossible to proceed beyond the narrow strip of coast bordering the cliffs.

To the southward of East Point there is a rock 3 ft. high, a cable from the shore. Off the South Point are two rocks, one a pyramid 60 ft. high, the other a low rock 3 ft. high. Off the S.W. side are two rocks awash half a mile from the shore, and off the N.E. side is a rock 2 ft. high a cable from the shore. Soundings of 50 to 90 fathoms were obtained at 1½ mile from the shore on all sides of the island. Kelp grows on the N.E. side in a depth of 12 fathoms at a quarter to half a mile from the shore.

Anchorage may be found just outside the kelp in 15 fathoms, abreast of the 2-feet rocks, but this anchorage should be used with caution, as the survey of the island is not complete.

Pigs are to be found on the irregular ground above the cliffs, but as the animals feed on sea-birds' eggs, their flesh is fishy and unpalatable. A flock of 23 goats were seen by the brothers Stoltenhoff, when they first landed here, but the last four of these were shot in February, 1873, by a boat's crew from Tristan. Fish are abundant, and may be readily caught by hook and line.

Two Germans, Frederick and Gustav Stoltenhoff, were taken off Inaccessible Island by H.M.S. *Challenger*, having lived there two years, during which time they received only three visits from the outer world, two of these being from the Tristan people in their annual seal hunting excursion, and one from a French barque in September, 1872, with whom they exchanged their seal skins and oil for provisions, &c. They first arrived in November, 1871, and during their sojourn endured many privations. The hut in which they lived (destroyed at their departure) stood on the shore of a small bay, on the East side of the island, near a waterfall. H.M.S. *Challenger* anchored off this bay in 15 fathoms. The penguins, they state, make their appearance at Inaccessible Island in the month of June, and soon afterwards begin to lay their eggs. The birds disappear for a short time in January after the eggs are hatched and the young are ready for the sea, and then come back to moult, finally leaving the island in April.

Nightingale Islands, a group of three, in a line North and South, were partially surveyed by the officers of H.M.S. *Challenger*, in 1873. The group consists of one large and two small islands, with several rocks close to their coasts, but there is apparently no outlying danger. The large island is 1¼ mile long East and West, and three-quarters of a mile wide, and has two peaks, the eastern one of which is rugged and precipitous, 1,100 ft. high, and appears conical on a N.E. and S.W. bearing; the other, 960 ft., slopes gently on all but its South side.

The Northern island, *Stoltenhoff*, lies 9 cables from the main island, and is a flat-topped, precipitous rock, 4 cables long, 1½ cable broad, and 325 ft. high, formed in one large and two small pieces by narrow chasms which can only be distinguished on one bearing. Kelp extends a quarter of a mile from the East side of the islands, but there is little or none on the South or West sides, which are the most exposed.

Soundings, from 50 to 200 fathoms, coral, were found at about 1½ mile from the shore. A few sunken rocks border the South shore, but they are readily seen. There is no beach of any kind, but an easy landing can be effected on the rocks at the N.E. point of Nightingale Island.

Fresh water may be obtained in a cave close to the landing place. There are neither pigs nor goats on Nightingale Island. During the breeding season of the penguins, from August to November, it is difficult to walk on the islands, the birds and their nests occupying almost every inch of the damp ground between the tussack grass, 8 or 9 ft. high, which overruns the islands.

11. DIEGO ALVAREZ, OR GOUGH'S ISLAND.

This island appears to have been discovered and originally named by the Portuguese; but having been seen by Capt. Charles Gough in the *Richmond*, bound to China, 1731, it has since borne his name. Capt. Heywood, in the *Nereus*, visited this island on the 8th of January, 1811, and made the longitude, by his chronometers, 2° 18′ East from Tristan da Cunha; this gives the long. 9° 45′ W. By a mean of observations in nine other ships, its centre has been given in 40° 19½′ S., and 9° 41½′ W. Capt. Broughton, in 1795, gave the lat. as 40° 19′, and the long. as 9° 27′ or 9° 30′; but he observes that at the time the horizon was very confused; and other ships have given the longitude nearly the same. The *Coutts*, Capt. Robert Torin, in 1800, made it, by lunars, 9° 46′.

Capt. Heywood found the summit of this island to be 4,380 ft. above the level of the sea. The surface of the isle was mostly covered with a light coat of mossy grass. In some places were a few small bushy trees, like those of Tristan da Cunha. The cliffs rise precipitously from the sea, and from their fissures issue several beautiful cascades of water. At a cove on the North side of the island the boat landed with safety, just to the eastward of one of the rocky islets adjoining that side of the island.

Near the N.E. point of the island is a rock exactly resembling a church, with a high spire on its western end, and therefore called the *Church Rock*. To the southward of this rock, on the East side of the island, near the shore, there is an islet, within which the landing is safe and easy, it being protected from the swell and northerly winds by the N.E. point. Here several Americans resided, but they had been unsuccessful during a long stay, most of the seals having deserted the island; but plenty of fish were procured, and birds of good flavour were caught by lighting a fire upon one of the hills in the night.

The Americans said a ship might anchor in safety between the islet and the S.E. point of Gough's Island, at about half a mile from shore, in about 20 fathoms, tolerably good ground.

In December, 1813, H.M.S. *Semiramis* visited this place and found it deserted.

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12. BOUVET'S OR CIRCUMCISION ISLAND.

This island was discovered by M. Louzier Bouvet, in the French frigate *L'Aigle*, accompanied by *La Marie*, on the 1st of January, 1739. The particulars, with a plate, were published by Mr. Dalrymple, in his collection of 1775.

Between the parallels of 48° and 49° S., and in about 7° of longitude East from Tenerife (9° 40′ West of Greenwich), the fogs commenced, and became so thick that the two ships could not see each other at the distance of a pistol-shot. On advancing more to the South these fogs were frequent.

On the 15th of December icebergs were seen, some appeared to be 100 fathoms high above the water. Much drift or broken ice was met with, and the ships luffed up, in order to avoid damage. Some icebergs, subsequently seen, were supposed to be 200 fathoms in height. The navigation became dangerous; and for many days that the ships were in these seas, the masts, cordage, and sails, were covered with ice.

On the 1st of January, 1739 (the festival of the Circumcision), at 3 p.m., the ships in 54° 20′ of latitude, and longitude, as *computed*, 25° 47′ E. from Tenerife (9° 7′ W. from Greenwich), land was seen to the E.N.E. at 8 or 10 leagues. It seemed very high, covered with snow, and surrounded with ice to a considerable distance. On the 2nd of January, the ships having proceeded more to the S.S.E., the western part of the land bore N.E. about 13 leagues. On the 4th they had advanced to 5 leagues from the land, which, high and rugged, bore E.N.E., and they finally lost sight of it on the 9th, leaving it to the southward. It appeared to be an island, about 5 miles in length W.N.W. and E.S.E.

Notwithstanding the preceding description, this land was for a time given up as imaginary only. Captain Cook sought for it without success in 1775; on the 16th of February he came up from the southward, under double-reef topsail and courses, having a very fresh gale, with snow and sleet. On the 17th he was in 54° 20′ S., long. 6° 33′ E., and thence proceeded to the eastward, with a prodigious high sea from the South. He continued his course to the eastward until the 21st, and concludes his description of the route with this observation:—

"We had now run down thirteen degrees of longitude in the very latitude assigned for Bouvet's Land. I was, therefore, well assured that what he had seen could be nothing but an island of ice; for, if it had been land, it is hardly possible we could have missed it, though it were ever so small. Besides, from the time of leaving the southern lands, we had not met with the least signs of any other. But, even supposing we had, it would have been no proof of the existence of Cape Circumcision; for I am well assured that neither seals nor penguins, nor any of the oceanic birds, are indubitable signs of the vicinity of land. I will allow that they are found on the coasts of all these southern lands; but are they not also to be found in all parts of the Southern Ocean? There are, however, some oceanic or aquatic birds which point out the vicinity of land, especially shags, which seldom go out of sight of it; and gannets, boobies, and man-of-war birds, I believe, seldom go very far out to sea."

Notwithstanding the evidence of the existence of this island, the magnetic expedition under Captain Sir J. C. Ross sought for this island in vain. "On the 17th March, 1843, they reached the latitude of Bouvet's Island, 54° 19′, about 8° to the westward of the assigned position; but they, like Cook, searched for it in vain; and Captain Ross concludes that Bouvet had been deceived by the form of an iceberg. The last berg was seen on the 25th, in lat. 47° 3′ S., long. 10° 51′ E."—*Naut. Mag.*, October, 1843, p. 678.

Whoever refers to our chart will perceive, by the track of Captain Cook, that he advanced from the southward *a little too far to the East.* He was misled by the original longitude of Bouvet. This is clear: for Captain Lindsay, in the *Swan*, descried the land on the 6th of October, 1808, which was found to be high and covered with snow. From this time to the 11th he made every endeavour to get close to the land, but found that it could not be approached within 3 miles, being surrounded by a mass of solid ice. The situation of the ship was at times perilous, it being in darkness, and beset with loose masses and floating islands of ice.

The existence of the island has been proved by another vessel, the *Otter*, when it was seen nearly at the same time, October, 1808.

From the observations taken in the *Swan*, the island appears to lie in 54° 16′ S. and 6° 14′ E. It appeared to be about 5 miles in extent, from East to West. The West end, which is very high, is now called *Dalrymple's Head.* It has been suggested as probable, that the isle may be approached in January or February, or during the summer of the southern hemisphere.

According to the log book of the *Sprightly*, Captain Norris, a vessel belonging to the firm of Enderby's, the following passage, quoted by Sir John Ross, refers to this vicinity:—December 10th, 1825. The island is in lat. 54° 15′ S., long. by chron. 5° E., and as we are now certain that it is an island, we name it Liverpool Island. It appears to extend 3 or 4 leagues from North to South; the North end is rugged, the South end low, the middle high and covered with snow. The sharpness of the rocks, and the weather coming on thick with much sleet and snow, was the whole and sole reason for not making successful landing.

On December 13, 1825, they met with another island. "This island, which we have named Thompson Island, bears about N.N.E. 15 leagues from Liverpool Island. There are also three rocks, which we named the Chimneys, to the S.W., 4 or 5 miles from Thompson Island, and another rock 3 miles to the southward of them. This island is in lat. 53° 56′ S., long. 5° 30′ E. On December 16th we sounded on the South side of the island, and found from 35 to 20 fathoms, black sandy bottom, at a mile from the shore. Caught a number of small fish, resembling codfish. On the 18th they landed from the boats, but stormy weather immediately following, they could not regain the ship until the 24th, having killed only 48 seals. The S.W. point is the only place which affords a landing, as the boats went entirely round the isle, and nothing but perpendicular rocks could be seen. It bears evident marks of having been a volcano, as it is nothing less than a complete cinder, with immense veins of lava which have the appearance of black glass, though some are streaked with white."

From these statements it appears that there is more than one island, but not in the positions given, as Sir James Ross passed so near them that he must have seen them, had they been correctly stated. That they do exist *somewhere* seems morally certain, and that the islands seen by Bouvet, Norris, and Lindsay may refer to three separate localities; that there are two, is obvious from Captain Norris's statement. Their character must be left for future determination.

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13. THE FALKLAND ISLANDS.

The Falkland Islands, situated between 51° and 52° 30′ South latitude, and 57° 30′ and 61° 30′ West longitude, consist of two principal islands, the East and West Falkland, with a considerable number of others, of different sizes, clustered around them and in the straits between them.

The greatest length of East Falkland is about 95 miles, the mean 85; the greatest breadth about 53 miles, the mean may be averaged at 40 miles. The West Falkland is about 80 miles in length; the width varies considerably, but 40 miles may be considered the greatest, and 25 miles the mean. The remaining islands, about 200 in number, vary very considerably, from 16 miles in length by 8 miles in breadth, to mere islets of half a mile in diameter.

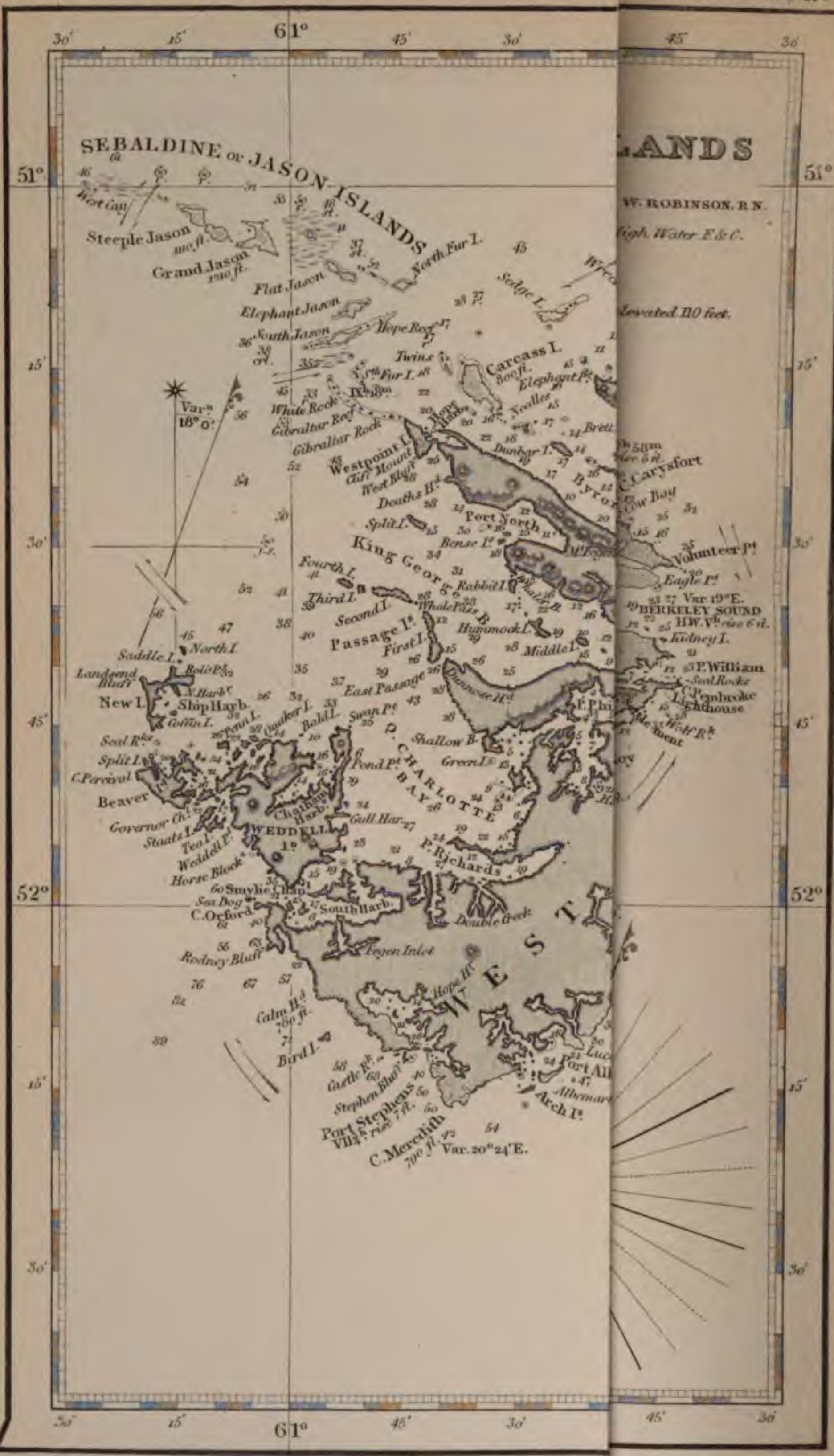
The sovereignty of the Falklands is now vested in the British crown; but the title has been subject to much dispute, and has occasioned much dissertation. The following short history, collected from Captain FitzRoy and others, will explain the grounds on which the various claims rest.

It has been asserted that Americus Vespucius, then employed by the King of Portugal, saw these islands in 1502; but if the account of Americus himself is authentic, he could not have explored farther South than the right bank of La Plata. If the Portuguese, or any other people, actually traced, or even discovered, portions of coast South of the Plata before 1512, it appears strange that so remarkable an estuary, 120 miles across, should have been overlooked, especially as soundings extend 200 miles seaward of its entrance; and that the world should have no clear record of its having been discovered prior to the voyage of Juan de Solis, in 1512. Vespucius has already robbed Columbus, and his predecessor Cabot, of the great honour of affixing their names to the New World; shall he also be tacitly permitted to claim even the trifling distinction of discovering the Falkland Islands, when it is evident he could not have seen them?

On the 14th of August, 1592, John Davis, who sailed with Cavendish on his second voyage, but separated from him in May, 1592, discovered the islands now called Falkland.

In 1683-4, Dampier and Cowley saw three islands in lat. 51° to 51° 20′ S., which they (correctly) supposed to be those seen and named by Sebald de

Face p. 273


SEBALDINE or JASON ISLANDS
LANDS
W. ROBINSON, R.N.
High Water F. & C.
Elevated 110 feet.
61°
51°
52°
Steeple Jason
Grand Jason
Flat Jason
Elephant Jason
South Jason
North Fur I.
Sedge I.
Hope Reef
Twins
Carcass I.
Elephant Pt
S. Fur I.
White Rock
Gibraltar Reef
Gibraltar Rock
Westpoint I.
Needles
Dunbar I.
Byron
C. Carysfort
Deaths Hd
West Bluff
Port North
Split I.
Fourth I.
Third I.
Second I.
First I.
King George B.
Rabbit I.
Hummock I.
Middle I.
Volunteer Pt
Eagle Pt
BERKELEY SOUND
Var. 19°E.
Kidney I.
P. William
Seal Rocks
C. Pembroke
Lighthouse
Passage Is.
East Passage
Saddle I.
North I.
Landsend Bluff
New I.
Ship Harb.
Coffin I.
Seal Rks
Split I.
C. Percival
Beaver
Governor Ch.
Staats I.
Teal I.
Weddell I.
WEDDELL I.
Horse Block
Chatham Harb.
Swan Pt
Quaker I.
Bald I.
Pond Pt
Gull Har.
Shallow B.
Green I.
Q. CHARLOTTE BAY
P. Richards
Smylie Chan.
Sea Dog
C. Orford
South Harb.
Double Creek
Rodney Bluff
Fegen Inlet
Hope Ht
WEST
Calm Hd 780 ft.
Bird I.
Castle Rk
Stephen Bluff
Port Stephens
C. Meredith 700 ft.
Var. 20° 24' E.
Port Albemarle
Arch Is.
Var. 18° 0'

Weert. It was called by the editor of Cowley's narrative *Pepy's Island*, in compliment to the then Secretary of the Admiralty.

Sir Richard Hawkins sailed along the northern shores of these islands in 1594, and he, ignorant of Davis's discovery, named them *Hawkins's Maiden Land.* His account appearing first and prominently before the public procured for them the name by which they were known, until Stroug, in 1690, sailed through, and anchored in the channel, which he named Falkland Sound. How it happened that the name *Falkland*, originally given to the sound alone, obliterated Hawkins, and has never yielded to Davis, is now a matter of very trifling importance.

Several ships of St. Malo passed near the Eastern Falklands between the years 1706 and 1714, from whose accounts M. Frézier compiled his chart, published in 1717. In consequence of the visits of these ships of St. Malo, the French named the islands *Les Malouines.* The Spaniards adopted the French name, slightly altered by changing Malouines into Malvinas.

During the early part of the last century France maintained a lucrative commerce with Chilé and Peru by way of Cape Horn, and the advantages of a port at the eastern extremity of the Falklands did not escape her active discernment, and at the commencement of 1763 the court of France determined to form an establishment at them. De Bougainville proposed to commence it at his own expense, and accordingly set out from St. Malo with an armament and settlers. On the 17th of March, 1764, having arrived at the Falklands, Bougainville decided to place his establishment at Port Louis, and forthwith commenced operations.

On the 23rd of January, 1765, these islands were taken possession of for the British Crown by Commodore Byron, and in consequence of his favourable report, Captain Macbride was sent out in H.M.S. *Jason* to begin their colonization. He arrived at Port Egmont in January, 1766.

Spain laid claim to the islands immediately after the French settlement, which was given up to Spain on April 1st, 1767, who indemnified the settlers. In 1770, a Spanish armament attacked the British colony at Port Egmont, and obliged it to surrender, but it was restored by the Spanish government. It was forsaken, however, in 1774, but the signals of possession were left flying. Spain afterwards withdrew from the islands, and left them uninhabited, probably at the commencement of the present century, and thus there was no person left who claimed even the shadow of authority over them.

From these short notices it will appear evident, that if discovery and prior occupation give a title to new and uninhabited countries, they undoubtedly belong to Great Britain; for Davis first discovered them; Hawkins first named them; Strong first landed on them; and (excepting the French) Byron took possession of them; and (again excepting the French) Macbride first colonized them. And with respect to the French claim, it was, as before stated, resigned for ever to Spain. The right of sovereignty, therefore, rests between Spain and England; and Spain's only claim rests on the unstable foundation of a papal bull.

The islands then remained uninhabited and unclaimed until the month of November, 1820, when Commodore Jewett, then commanding the *Heroine* frigate, took formal possession of the islands in the name and by the authority of the United Provinces of South America, or government of La Plata, otherwise Buenos Ayres. This act of the Argentine Republic was scarcely known in Europe for many years, and it is difficult to see upon what reasonable grounds they rested their claim.

In 1823 the Buenos Ayrean government took another step in the appointment of a "comandante de las Malvinas;" and in the same year, Don Louis Vernet, a German by birth, solicited and obtained from them the fishery and cattle on the eastern island, and land for a settlement. This did not prosper, and in the next year M. Vernet sailed himself in a second expedition. In 1828 the government of Buenos Ayres granted to him (with certain exceptions) the right of property in the Falkland Islands, and in Staten Land; with entire and sole right to all its soil, cattle, horses, hogs, fisheries, &c.

"The total number of persons on the island consisted of about one hundred, including twenty-five Gauchos,* and five Carruas Indians. There were two Dutch families (the women of which milked the cows and made butter); two or three Englishmen; a German family; and the remainder were Spaniards and Portuguese, pretending to follow some trade, but doing little or nothing. The Gauchos were chiefly Buenos Ayreans, but their capitaz or leader was a Frenchman."

In 1829 Vernet warned off some North American sealers; and in 1831, upon their repeating the sealing excursion, of which he had complained, he detained them by force. This act, and the circumstances arising out of it, drew upon him and his unfortunate colony the hasty indignation of Captain Silas Duncan, of the United States corvette *Lexington*, who, on his own responsibility, surprised, assaulted, and made prisoners of many unoffending people, and unwarrantably destroyed both property and buildings. M. Vernet was at the time absent at Buenos Ayres, attending the trial of the sealers in question; but Mr. Brisbane, and several others, were put into irons and carried away on board the *Lexington* to Buenos Ayres, where they were delivered up to the Buenos Ayrean government, in February, 1832. The United States' government supported their officer, and formally demanded a full reparation of the wrongs done to their citizens.

While the United States and Buenos Ayres were discussing the question at issue, Great Britain, following up the solemn warning she had given to Buenos Ayres, issued orders to the commander-in-chief on the South American station to re-assert her sovereignty of the Falklands. Accordingly, Commodore Onslow, in H.M.S. *Clio*, hoisted the British flag at Port Louis, on January 2nd, 1833, while, about the same time, H.M.S. *Tyne* anchored in Port Egmont, on the Western Island. The small Buenos Ayrean garrison quietly withdrew, and sailed for the Plata. Shortly before this garrison had mutinied, and had barbarously murdered their commanding officer. Having proclaimed the Falklands to belong to Britain, they departed, leaving the flag in charge of an Irishman, who had been Mr. Vernet's storekeeper.

In March, 1833, Captain (afterwards Admiral) FitzRoy, in the *Beagle*, anchored in Berkeley Sound. He found the island in a very disordered state from the want of government. During his stay, Mr. Brisbane returned as the agent for Mr. Vernet's private affairs. The whole colony was a miserable ruin, caused by the *Lexington's* visit; and on the 6th of April he left the islands with dismal forebodings from the disordered state of society, and these were exceeded by the sad reality.

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* The *Gauchos* are the hunters of South America, celebrated for their horsemanship, and for the use of the *bolas* and the *lasso*, with which they catch wild horses and cattle.

In a despatch, dated November, 1833, it appears that eight Gauchos and Indians of bad character, on the 26th of August in that year, had attacked and brutally murdered Mr. Brisbane, Dickson, the person in charge, and three other principal persons; after which they pillaged the houses and plundered the place of whatever it contained, and drove off all the cattle and horses up the country, laden with their booty. Thirteen unarmed men, three women, and two children, remained in the town two days with the murderers, and then escaped to one of the islands in the bay, where, until relieved by the English sealer *Hopeful*, they lived upon birds' eggs and fish. The murderers were subsequently taken and sent to Buenos Ayres.

On the 10th of March, 1834, Captain FitzRoy again visited Berkeley Sound; the settlement looked more gloomy than ever, and not far from the house where he had lived they found, to their horror, the feet of poor Brisbane protruding above ground. So shallow was his grave, that dogs had disturbed his mortal remains, and had fed upon his corpse. This was the fate of an industrious, honest, and most faithful man.

At the beginning of the year 1834 Lieutenant Henry Smith, R.N., was appointed governor of the islands, accompanied by a small party as the nucleus of a future colony. The old settlement at the head of Berkeley Sound was fixed upon as the head quarters. On the 23rd of August, 1841, Lieut. R. C. Moody, R.N., was appointed lieutenant-governor, and arrived in Port Louis on January 15th, 1842.

This energetic governor endeavoured to draw attention to and develop the resources of the Falkland Islands, and the seat of government was removed from Port Louis, at the head of Berkeley Sound, to Stanley Harbour, in Port William; the former, though an excellent and easily reached anchorage, being farther removed from the line of route than was necessary.

The principal feature in the recent progress of the Falkland Islands is the occupation of a portion of East Falkland by a commercial company. In the year 1844, Mr. Samuel F. Lafone, who had been extensively engaged in the hide and cattle trade on the River Plate, after some preliminaries, entered into negotiations with Her Majesty's government in 1845, for a contract to purchase the southern portion of the East Falkland, the islands adjacent, and Beauchene Island, and the cattle upon the Falklands, upon the payment of £10,000 at the period, and £20,000 in ten years from January 1st, 1852. In May 1851, a company was formed in London to carry out more fully the scheme of turning the advantages of the islands and their herds of wild cattle to greater account. It was incorporated by royal charter, and purchased Mr. Lafone's interest for £30,000; and subsequently an extension of the term of dominion over the wild cattle was granted until January, 1860. The whole of the available land for grazing, in both East and West Falkland Islands, had in 1874 passed into the hands of private individuals. The company's chief locality is at Stanley, but their operations are conducted in different portions of their domain. The population of the Falklands in 1881 was 1,543 as compared with 950 in 1872; the islands of any size being now nearly all inhabited.

GENERAL DESCRIPTION.—The whole group of the Falkland Islands is deeply and variously indented by sounds, bays, harbours, creeks, and inlets. Perhaps there is no spot in the whole world so singularly irregular in its coast line, and so full of harbours and creeks, as the Falkland Islands. This formation diminishes the area considerably, but at the same time it presents more than counterbalancing advantages.

The area of East Falkland may be roughly computed at about 3,000 square miles; the area of West Falkland may be estimated at about 2,000 square miles; and the whole group, East and West Falkland, with all the surrounding islands, at about 6,000 square miles. The two islands are divided by a strait containing several small islands, and its navigation requires great care, for though well surveyed, and all known dangers clearly defined upon the charts, the currents are very strong, and the wind increases with unusual rapidity.

The sovereignty of the Falklands, as before stated, is now vested in the British Crown, and their local administration is conducted through the medium of a governor, who resides at Stanley, aided by the usual staff of officials. A small detachment of British troops, under the command of an officer, is stationed in the settlement, and it is the duty of the Admiral of the station to visit the colony periodically, for the protection of commerce, &c.

These islands, though by geographical position of the greatest importance to the mercantile world, were but little regarded up to 1851, when the Falkland Islands Company was incorporated under royal charter from the British Government, to open up the resources of East Falkland Island, by a large grazing undertaking, which necessitated the establishment of stores, artificers, &c., at Stanley, whereby the settlement has been gradually improving, until at this time ships can be provided in every way much cheaper than at any of the ports in South America—a desideratum that cannot be too widely known, seeing that these islands are situated exactly where their numerous and splendid harbours, particularly that of Stanley, afford protection and opportunity for the repairing of injuries sustained by shipping passing in the vicinity of Cape Horn, where a larger amount of annual injury is done by severe weather than in any other locality.

In their general aspect these islands have few features of interest to remark upon. The southern portions of the East Falkland are so low that they are hardly perceptible from the deck of a ship at 5 miles distance. The western island is more marked, some of the hills being between 2,000 and 3,000 ft. above the sea level.

There are no trees upon these islands, and only two or three varieties of indigenous shrubs from 1 to 8 ft. in height. What they term the tea plant (*Myrtus nummuralia*) is abundant, the leaves being used for making a decoction somewhat similar to tea. The berry of this shrub is of a rose colour, and the flavour is appreciated. Celery (an excellent antiscorbutic) grows in wild luxuriance, and European vegetables thrive well wherever they have been tried.

Cereals have been grown, but the absence of sufficient sun for ripening them precludes the prospect of their being cultivated with success.

Peat exists of good quality everywhere, and is generally used for fuel. Substances, having somewhat the appearance of coal, have been found in various localities, but from their analysis, and from the opinion of geologists, there is every reason to suppose that bituminous coal does not exist.

Cattle and sheep of European breeds, appear to thrive remarkably well. The former are small, but improving in size from bulls introduced by the Falkland Islands Company, and their flock of Cheviot sheep, now numbering about 70,000, yield fleeces weighing as high as 10 or 12 lbs., and as good mutton as any in the world; but, from the paucity of demand, it only realizes about 4*d.* a pound. In 1879 the value of the wool exported amounted to £55,440.

Port Stanley has become the best port of refuge for ships between Valparaiso, on the West coast of South America, and Rio Janeiro upon the eastern side. In order to attract more shipping, and thereby more consumers for their otherwise unprofitable staple, the Falkland Islands Company have establishments at Stanley for the supply and repair of ships, upon the lowest scale that can be adopted without loss; and they seem determined to spare no effort to carry out their object, which has been materially assisted by the British Government having placed a lighthouse at the eastern extremity of the East Falkland, which makes the splendid harbour of Stanley accessible by night or day.

These islands have no native inhabitants or wild animals of any kind, except pigs, rabbits, rats, and a species of fox, now almost exterminated. There were formerly many wild cattle on the islands. Water fowl of many sorts are abundant, affording both amusement and good eating for the inhabitants of Stanley. Penguins contribute eggs in great abundance, which have a somewhat fishy flavour, and they have of late years become in request for their oil. Seals were formerly very plentiful on the shores of the islands, and whales in their vicinity, but they are both becoming scarcer on account of being so much sought after.

Fish are very abundant in the creeks, and efforts have been made to salt a species of mullet for the markets in South America; but whether from the climate being unsuitable, or any peculiarity in the fish, they assume a colour that is prejudicial to their sale.

Fresh water is abundant upon the two large islands; not so upon the smaller ones, which renders them for the most part unfit for grazing purposes.

The country in the northern part of the East island is rather mountainous. Nearly the highest part, called *St. Simon*, 1,600 ft., is at no great distance from the bottom of Berkeley Sound.[*] The tops of the mountains are thickly strewn with large boulders, or detached stones, of which quantities have fallen in some places in lines along their sides, looking like rivers of stones; these are alternated with extensive tracts of marshy ground, descending from the very tops of the mountains, where many large fresh water ponds are found, from 1 to 2 ft. deep. The best ground is at the foot of the mountains, and of this there is abundance fit for cultivation, in plains stretching from 5 to 15 miles along the margin of the sea. In the southern peninsula, since called *Lafonia*, there is hardly a rising ground that can be called a hill. Excellent fresh water is found everywhere, and may be procured either by digging, or from the rivulets, which flow from the interior toward the sea, through valleys covered with a rich vegetation.

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[*] A chain of very rugged topped mountains, called the *Wickham Heights*, extends due East and West from Port William to Port Sussex, nearly across the northern portion of the island, to the southward of Mount St. Simon, above mentioned. The height of this range varies from 1,400 to 2,300 ft. (increasing towards the West side); and as the quarts rock crops out nearly vertical, and with great irregularity, this range can only be crossed at certain places, which constitutes a feature of some importance in relation to the drives of cattle. The contrast between the country North and South of the Wickham Heights is very remarkable.

Of rivers, there are but few in the Falkland Islands. The San Carlos, in East Falkland, is the largest known one: it is very winding, and only about 30 miles in length, navigable for boats to a distance of about 8 miles, and for that distance the width may be averaged at 100 yards. The sources of the San Carlos appear to be many small streams, draining all the country to the West and S.W. of the western extremity of Port San Salvador, also part of the country to the northward. It is in general a deep stream, with high banks. The bed is of a red sand, gravel, and in spots muddy.

The Arroyo Malo, or Matson River, is another large stream, which drains the long valley, separating the Simon Range from the Wickham Heights It rises at the foot of Mount Usborne, and running in an easterly direction falls into an arm of Port San Salvador, a distance of 18 miles. It is not navigable; and as it is completely a mountain stream, it often becomes difficult and dangerous to cross, by reason of sudden floods swelling it into a deep and rapid river.

WEST FALKLAND.—The Western Island is divided from the Eastern by Falkland Sound, or rather Strait, a name given by our countryman, Strong, in 1690, and which subsequently became applied to the whole group. The north-western side of the island has been much frequented by whale fishers and sealers, and still continues to be so, though the indiscriminate slaughter of these animals has much reduced their numbers, and rendered the fishery less lucrative than formerly. Their chief rendezvous is at New Island.

From the coast the island appears upon the whole to be more hilly, and the hills to be more rounded, lumpy, and isolated than those in the East Falkland. They appear to possess the same geological character, viz., varieties of quartz rocks; and their height may be assumed as varying from 800 to 2,200 ft. The highest peak is *Mount Adam*, 2,315 ft., in the N.W. part of the island.

The principal range, the Hornby Hills, is on the eastern side of the island, and runs in a contrary direction to those in East Falkland, its general bearing being North and South, and extending from White Rock Harbour to Fox Bay, parallel to the coast line. Mount Maria, at the back of Port Howard, is 2,270 feet in height. There is also a very remarkable rugged ridge of quartz rock, about 150 ft. in height, which rises abruptly from the sea, and follows the coast line from above Port Howard to Fox Bay, a distance of about 40 miles. Between this ridge and the range of hills is a longitudinal valley, intersected occasionally by high land (the roots of the range).

The North coast of West Falkland consists of long islands extending East and West, with narrow openings between them, of which Tamar Pass and the entrance to Port Egmont are the most remarkable. Upon these islands are isolated hills, of conical and lumpy forms, rising abruptly from gently-undulating ground. The islands farther to the westward, called the Jasons, are hills of this abrupt character, and from 800 to 1,200 ft. in height.

The West coast of West Falkland, until Captain FitzRoy's survey, was not much known, except to whalers and sealers. It is more variously and deeply indented by the sea than even the coasts of East Falkland. The hills on the South coast of West Falkland appear to be in masses, and their termination at the coast line to be in lofty rugged cliffs. There is a river, the Chartres River, about the same size as the San Carlos, in East Falkland, which falls into King George's Bay. Rivers, however, can scarcely be needed in a country so fully and variously indented by the sea as these islands are. For the purpose of fresh water, the want of rivers is amply supplied over the whole country by many small fresh water lakes or ponds, varying in size from 30 yards to 3 or 4 miles in circumference, and by innumerable springs and rivulets.

Mr. Arthur Bailey, the Surveyor-General, who visited West Falkland in the *Foam*, in June, 1867, says:—"I examined the vicinity of White Rock Harbour. Round the coast the camp is dry, and I should say well adapted for sheep farming. In a S.W. direction from White Rock Harbour for 24 miles, skirting Manybranch Harbour, and leaving the Six Hills to the right, the whole district is good for sheep farming. I should estimate the total number of wild cattle on the island to be about 5,000." In 1867 there was not a settler on the island, and a proclamation was issued to the effect that any person applying to the Governor, and on payment of £5 per 6,000 acres, could obtain a license to occupy a station on the West Falkland for one year, and any time before the expiration of the licence (certain conditions having been complied with), could obtain a lease for 20 years, at an annual rent of £10 per 6,000 acres. The effect of this proclamation was that in 1868 the whole of the available land on the island had passed into the hands of private individuals, producing a revenue of upwards of £1,350.

Productions, &c.– One of the most remarkable of the plants that grow on the Falklands is the Tussac; it is a gigantic sedgy grass; the average length of the blade is 7 ft., and of the stalk 4 to 6 ft. The plants grown in bunches close together, and as many as 250 roots spring up from one bunch. In old plants the decayed roots of successive shoots form a cushion of dry entangled fibres, which raise the bunch from the ground. This cushion sometimes attains to a great size and height, 6 or 7 ft., and 4 or 5 ft. in diameter, so that a person standing in a patch of old tussac may be quite sheltered or concealed. It grows with great luxuriance on the coasts, down to high water mark; and cattle and horses feed on it with the greatest avidity, and speedily become fat. About 3 or 4 inches of the roots are very agreeable to man, being crisp and of a nutty flavour, and was the food of two Americans who were upon the Western Island for fourteen months. It is an exceedingly valuable plant to the colony. The grass, growing in large tufts upon the high base of decayed roots, resembles at a great distance a diminutive grove of thickly-clustered palms; and from the dark green and luxuriant appearance given to the smaller islands clothed with tussac, the richness of tropical vegetation is forcibly recalled to the memory. The only approach to a tree is the Falkland Islands box, a species of veronica, which grows to a height of perhaps 3 ft., and affords no protection to man or beast.

The large round gum plant, common in Patagonia, &c., is abundantly found, and, when dried, is useful for kindling fires, being extremely combustible. A gum exudes from it, which is called "balsam," and is used as a curative.

European vegetables thrive exceedingly well, and every house in Stanley has its plot of garden ground attached, the number of vessels calling here offering a ready and profitable market for their surplus produce.

Winds, Climate, &c.—In a former portion of the work we gave a general description of the climate of these islands. The following remarks will be found important in connection with those previously given. The first are by Captain FitzRoy.

Wind is the principal evil at the Falklands: a region more exposed to storms, both in the summer and winter, it would be difficult to mention.

The winds are variable—seldom at rest while the sun is above the horizon, and very violent at times; during the summer, a calm day is an extraordinary event. Generally speaking, the nights are less windy than the days; but neither by night nor by day, nor at any season of the year, are these islands exempt from sudden and very severe squalls, or from the gales which blow heavily, though they do not usually last many hours.

It has been stated by Bougainville and others, that in summer the wind freshens as the sun rises, and dies away about sunset; also the nights are clear and starlight. The information I have received, with what I have myself witnessed, induces me to agree with the first of these statements in its most general sense, and to a certain degree I can admit the second; but, at the same time, it is true that there are many cloudy and very windy nights in the course of each year, and I might also say month. The *Magellan* was driven from her anchors, though close to a weather shore, in the narrowest part of Berkeley Sound, and totally wrecked in Johnson Harbour, about midnight on the 12th of January, 1833.

The prevalent direction of the wind is westerly, having almost the constancy of the trade wind of the tropical zone. Gales, in general, commence in the N.W., and draw or fly round to the S.W.; and it may be remarked, that when rain accompanies a N.W. wind, it soon shifts into the S.W. quarter, and blows hard.

Northerly winds bring cloudy weather; and, when very light, are often accompanied by a thick fog; it is also worthy of notice that they almost always occur about the full and change of the moon.

North-East and northerly winds bring gloomy overcast weather, with much rain; sometimes they blow hard, and hang in the N.N.E., but it is more common for them to draw round to the westward. South-easterly winds also bring much rain; they are not frequent, but they blow hard, and as the gale increases it hauls southward. Though fogs occur with light easterly or northerly winds, they do not often last through the day.

Gales of wind, as well as squalls, are more sudden, and blow more furiously from the southern quarter, between S.W. and S.E., than from other directions.

Wind from the East is rarely lasting or strong; it generally brings fine weather, and may be expected in April, May, June, and July, rather than at other times; but intervals of fine weather (short indeed), with light breezes from E.S.E. to E.N.E., occur occasionally throughout the year.

Neither lightning nor thunder are at all common; but when the former occurs, easterly winds are expected to follow. If lightning should be seen in the S.E., while the barometer is low, a hard gale from that quarter may be expected. S.E. and southerly gales last longer than those from the westward, and they throw a very heavy sea upon the southern shores. In the winter, generally, there is not so much wind as in the summer; and in the former season the weather, though colder, is more settled and considerably drier. In different years, seasons vary so much, that those who have been longest about the islands hardly venture to predict what weather will be found during any particular month. All they say is, that January, February, and March, though warmest, are the windiest months; and that May, June, and July, though cold, are much less stormy. Dry weather may be looked for in September, October, and November.

I must here add one word in favour of the barometer, or sympiesometer. Every material change in the weather is foretold by these invaluable instruments, if their movements are tolerably understood by those who consult them, and if they are frequently observed. Mr. Low said to me, "The barometer is worth anything in these countries" (alluding to Tierra del Fuego, as well as the Falklands); "some say they dislike it because it is always so low, and foretelling bad weather; but how often do we have any other?" They must somehow think the barometer ominous, and overlook the use of the omen.

The temperature may be considered equable; it is never hot, neither is it ever very cold; but the average is very low; and in consequence of frequent rain and wind, a really moderate degree of cold is much more noticed than would probably be the case if the weather were dry and serene.

Governor Robinson, in his report for 1868, says:—"The climate, though disagreeable, on account of the high winds that usually prevail, is exceedingly healthy. In summer the wind rises in the morning, blows hard during the middle of the day, and falls away in the afternoon. On a calm day the sun has considerable power, but at other times the heat is neutralized by the strong keen wind, and it is only here and there in sheltered nooks that grain can be ripened, or European flowers brought to any perfection. In winter the wind is less boisterous than in summer; were this not so, the cold from May to September would be unendurable."

Sea Weed, or *Kelp*, as an indication of shoal water, is invaluable in these parts, and is therefore strictly to be noticed by the navigator. Capt. FitzRoy says—"In approaching the land, and especially while entering a harbour, a careful lookout should be kept for 'fixed kelp'—the seaweed growing on every rock at those places, which is covered by the sea, and not far beneath its surface. Lying upon the water, the upper leaves and stalks show, almost as well as a buoy, where there is a possibility of hidden danger.* Long stems,

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* The dangerous nature of kelp may be understood by the following remarks of Capt. King, in his Directions for the Straits of Magalhaen.

"With daylight and clear weather a vessel may close the shore without risk, because the water is invariably deep, and no rock is found which is not so marked by seaweed (or *kelp*, as it is generally called), that, by a good look-out at the mast-head, its situation is as clearly seen as if it were buoyed. By avoiding kelp, you are sure of having sufficient water for the largest ships on any part of this coast. At the same time it must be remembered that with leaves, lying regularly along the surface of the sea, are generally attached to rocky places, or else to large stones. Occasionally a few straggling stalks of kelp are seen in deep water, even in 30 fathoms, many of which are attached to stones, and so firmly, that their long stems will sometimes weigh the stone adhering to the roots. Such scattered plants as these need not be minded by a ship; but in passing to windward of patches or beds of kelp, or rather in passing on that side from which the stems stream away with the current, care should be taken to give the place a wide berth, because the only part which shows, when the tide is strong, lies on one side of (not over) the rocks. Where the stream of tide is very strong, this kelp is quite 'run under,' or kept down out of sight, and can no longer be depended on as a warning. When a clear spot is seen in the middle of a thick patch of fixed kelp, one may expect to find the least water."

Drift kelp, or that which is floating on the surface of the sea, unattached to any rock or stone, of course need not be avoided; it may be known at a glance by the irregular, huddled look which it has.

Mr. Darwin, in the third volume of the same work, remarks, "There is one marine production which, from its importance, is worthy of a particular history. It is the kelp, or *Fucus giganteus* of Solander. This weed grows on every rock, from low water mark to a great depth, both on the outer coast and within the channels. I believe, during the voyages of the *Adventure* and *Beagle*, not one rock near the surface was discovered, which was not buoyed by this floating weed. The good service it thus affords to vessels navigating near this stormy land is evident; and it certainly has saved many an one from being wrecked. I know few things more surprising than to see this plant growing and flourishing amidst those great breakers of the Western Ocean, which no mass of rock, let it be ever so hard, can long resist. The stem is round, slimy, and smooth, and seldom has a diameter of so much as an inch. A few taken together are sufficiently strong to support the weight of the large loose stones to which in the inland channels they grow attached; and some of these stones are so heavy, that when drawn to the surface, they can scarcely be lifted into a boat by one person."

THE COASTS.—BERKELEY SOUND is situated at the north-eastern extremity of the group. Governor Moody marked out the plan of a town to be called "*Anson*," after the great circumnavigator; but after much deliberation it was determined to have the principal settlement at Port William, lying adjoining to and southward of Berkeley Sound, the objection to which is the difficulty which vessels find in beating to windward through the Sound up to Port Louis. The greater advantages of Port William, as a port of refuge for large vessels, have led to this determination, although the land is less adapted

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kelp grows in some places from a depth of 30 fathoms, and that, on many parts of this coast, you may pass through thick beds of seaweed without having less than 6 fathoms of water. Still it is always a sign of danger, and until the spot where it grows has been carefully sounded, it is not safe to pass over it in a ship. As an instance:—after sounding a large bed of this weed in one of the *Beagle's* boats, and thinking it might be passed in safety, a rock was found, not more than 4 ft. in diameter, having only 1 fathom over it. Kelp is, therefore, always to be avoided."

for colonization; but this is perhaps subordinate to the consideration of the facility of supplying shipping.

Berkeley Sound is the *Puerto de la Soledad* of the Spaniards, and the *Acarron Bay* of the French. It was at the N.W. part of this harbour that the latter, under M. de Bougainville, had their settlement in 1764. It may be taken as limited by Eagle Point or Volunteer Point on the North, and Kidney Island or William Point on the South. It is 4 miles wide at the entrance, and upwards of 15 miles in length, terminating in the three excellent anchorages of Johnson Harbour, Stag Road, and Port Louis. Berkeley Sound was considered to be the only place on the East coast that could be entered at night, if the entrance had been made out before dark. It might even be worked into safely, nearly as far as Johnson Harbour. However, the lighthouse at Port William, presently alluded to, will facilitate the entrance to the principal port.

The settlement of Port Louis is securely situated along the edges of a small bay, which has a narrow entrance into it out of the Sound. The buildings constructed by the Spaniards were remarkable for their thick walls of stone; they are very straggling, covering a space of half a mile in length, and a quarter of a mile in breadth. Among them are the remains of one used as a church, and another as a hospital. These are now occupied by the Falkland Islands Company's officer, from whom information and assistance can be obtained.

Off the N.E. point of the Sound is a ledge, above water, called *Volunteer Rocks;* and about E. by N., 1¼ mile from the point, is the sunken rock upon which the *Uranie*, French frigate, unfortunately struck in February, 1820. This rock is the more dangerous, as with westerly winds the sea seldom breaks on it, and it is the only rock of the whole group on which kelp does not grow. It is nearly 9¾ miles N. 13° W., or N. by W. ¼ W. from the lighthouse on Cape Pembroke. The best marks to clear it, particularly in the night, are to keep Cape Carysfort to the westward of W.N.W. until Mount Low bears S.W. by S. ½ S., or Cape Pembroke light S. ½ E.; a vessel will then pass nearly 2 miles outside of it, and may then haul up for Mount Low, which is the most eastern high hill on the island, and may be easily seen, on a clear night, when to the northward of Volunteer Point; the summit, which is 840 ft. high, forms two peaks, and from the eastern one the land slopes down to the point which separates Berkeley Sound from Port William.

When these rocks are cleared, and the Sound is fairly entered, there is no danger except from a small ledge of rocks off Eagle Point, extending about half a mile from the shore, with kelp growing all over it, and therefore easily seen. Above this point the Sound is quite clear till well up, when a ledge of five or six black rocks, *Sea Lion Rocks*, will be seen on the North side, behind which is an excellent harbour, called *Johnson's Harbour*, with good holding ground in 6 or 7 fathoms, and greater convenience for watering than in any other part of the bay.

CAPE PEMBROKE is the easternmost extremity of the Falkland Islands, and the southern side of the entrance of Port William, in which is Stanley, the present seat of government.

The Lighthouse is an iron tower, 60 ft. high, painted in red and white bands, which shows a *fixed bright* light in all directions seaward, at an elevation of 110 ft., visible 14 miles. It is obscured towards Port William between the bearings of N.W. ½ N. and S.W. ½ W.

PORT WILLIAM is immediately to the South of Berkeley Sound, the former principal port. The entrance to it cannot be well made out till near the land, but the before-mentioned lighthouse is an excellent landmark. With a fair wind, and coming from the northward, after rounding Volunteer Point, Mount Low should be kept about a point on the starboard bow; some white sand hills will then be seen ahead and close to Kidney Island: at the same time Seal Rocks, which form the extreme of the South entrance to Port William, will be seen on the horizon, just open of Cape Pembroke, and about two points on the port bow. By continuing on this course till within a mile of Kidney Island (which can be approached in safety to within a quarter of a mile), the northern point of the entrance to Port William, *William Point*, will be made out clearly. It is low and rocky, and near its extremity is a stone beacon with a triangular top, 26 ft. high, which is visible 5 miles. This point may be passed within a cable's length, and the entrance to the harbour will be seen bearing S.W. The port is entered after passing William Point, and there is good anchorage in the bay, between it and Cape Pembroke, in from 11 to 12 fathoms, sheltered from all the prevailing winds. The next point is *Charles Point*, about 2 miles farther; it has two small detached rocks at its extremity, off which there is a kelp patch, close to the edge of which is deep water. *Yorke Point*, on the South side of the harbour, and the islets to the East of it, are all steep; the entrance is wide enough for a large vessel to work in, and the edge of the kelp is a secure guide; but the white sandy bay on the South side should not be entered, as it is shallow. In standing towards it a vessel should tack when in the line of the islets and of Yorke Point. Immediately the point is passed, Sparrow Cove will be seen open on the North side of the harbour, under Mount Low, and the entrance of Stanley Harbour on the South side. Above Port William anchorage, a long creek winds through the hills to the West up to Murrell River, its whole extent being about 3½ miles. The landing on all the beaches is bad, in consequence of the scattered fragments of quartz rock, from 1 to 3 ft. long, which will greatly injure a boat if she touches them. The only safe landing is on the rocks, where they are steep-to. There is a very good watering-place on the West side of the cove, on the North shore, in a bight outside the entrance to Weir Creek; but care must be taken in landing, on account of the stones. Water and peat are abundant. Vessels that remain in Port William will find good anchorage in Sparrow Cove, and an unfailing supply of good water in its N.W. corner. In Port Harriet, South of it, there is a good stream in a cove on the North shore, about a mile inside of the entrance.

STANLEY HARBOUR, the seat of the government, is on the South side of Port William. It is now provided with many advantages for the refitment and refreshment of passing vessels. The greatest drawback was the want of running water near the settlement, but this has been obviated by several wells, and a reservoir is also constructed, so that all vessels can now depend on a ready supply. Wild fowl and fish are very abundant. Steam coals can always be procured. Wood cannot be had, but peat, which is a fair and pleasant substitute for it, is plentiful, and when compressed is found to be a valuable fuel.

During the night of November 30th, 1878, an avalanche of peat nearly overwhelmed the town of Stanley.

Admiral George F. Hastings, R.N., who visited Port Stanley in H.M.S. *Zealous*, 1867, says:—"The ship was supplied with 408 tons of good coal in less than sixteen working hours, and I found every facility at Port Stanley in obtaining all supplies of provisions, &c. I consider that any ship bound to the Pacific would find it most advantageous to call at the Falkland Islands to obtain any supplies which may be required."

The following information respecting the mails, &c., is supplied by F. Coleman, Esq., the Secretary of the Falkland Islands Company:—Mails leave Stanley every six weeks for England, *viâ* Monte Video, arriving in about forty days, so that vessels can report themselves, and there is now the advantage of telegraphic communication from Monte Video to England.

The harbour dues amount to 6*d*. per register ton, including pilotage charges. Fresh water, fetched by ships' boats from the Government reservoir, 2*s*. 6*d*. per tun; ditto, 12*s*. 6*d*. per tun, delivered alongside in harbour; under 5 tuns, 16*s*.; ditto, delivered outside the harbour, 20*s*. per tun. Ballast, *free* by ship's own boats, or supplied at 7*s*. per ton; vegetables, 1*d*. to 2½*d*. per lb.; fresh mutton and beef, 4*d*. per lb. Steam coals, 60*s*. per ton. All kinds of ship chandlery are supplied on reasonable terms, by the Falkland Islands Company, which also undertakes shipping repairs, having a diving apparatus, means for heaving down, and hulks to receive cargo, discharging by steam if required. Their Colonial Manager, F. E. Cobb, Esq., is Lloyd's Agent, and Consul for Germany, Italy, and Belgium.

If the wind is southerly, the passage into Stanley Harbour should not be attempted except by a small quick-working vessel; but with the wind to the westward of S.W. it may be passed by large vessels. It is little more than a cable's length broad, but both points can be passed within 30 yards. If the wind is S.W., so as to make it necessary to pass very close to the western or *Navy Point* to fetch through, a vessel should work up well to windward of the entrance, and entering under all sail and with very good way on, directly the sails lift from the wind drawing out in passing the point, she should be kept a little higher, so as to shoot through with the sails shaking till she gets the steady wind inside the point. When inside the Narrows, the harbour may be traversed by any vessel drawing under 20 ft. There is 3½ fathoms a cable's length from the kelp on each side, and above 4 fathoms in mid-channel, close up to the town, which is about 2 miles to the westward of the entrance on the South shore. Large ships have plenty of room to round to and anchor in mid-channel, in about 5 fathoms, as far up as they choose to fetch. After passing the Narrows, the bottom is excellent, a stiff mud, which often causes some trouble in getting the anchor up again.

A long steam vessel should proceed well into Port William, or until the entrance to Stanley Harbour bears S.S.E., before steering towards it; and on leaving, when at the entrance, a N.N.W. course should be steered until Yorke Point just opens before altering course to the eastward out of Port William.

Sailing ships bound round Cape Horn should not enter Stanley Harbour, as the wind, which would be fair for them to sail, would be foul for getting through the Narrows. They may anchor outside the entrance, about a quarter of a mile N.W. of it. Vessels coming from Cape Horn might always go into

Stanley Harbour, as any wind which would be fair for them to sail, if bound to the northward, would always be fair to leave the harbour. Large ships, when abreast of the entrance in coming up Port William, not intending to enter, should stand towards the Narrows till they shut in the entrance points of Port William, when they may anchor in from 6 to 7 fathoms, about a third of a mile from the shore, and can easily leave with any wind.

As the flood tide sets strongly to the northward, and the ebb to the southward, in passing Cape Pembroke, you should not pass between that cape and Seal Rocks, unless the ship is under steam, or has a good commanding breeze; in light winds, or much swell, it is better to pass outside.

The previous description of, and directions for, Stanley, are chiefly derived from those issued by the Hydrographic Office. The following is by Mr. Phillips, pilot, of Stanley:—

Ships from the southward should sight Cape Pembroke, which is the easternmost point of the Falkland Islands, and on which there is a lighthouse with a fixed light. With a commanding breeze anything South of West, keep to seaward of Wolf Rock, and pass between Seal Rocks and Cape Pembroke, and then between Billy Rock and Seal Rocks, where there is plenty of water, and no danger that may not be seen. Having passed Billy Rock, haul up, and if in doubt, or if the pilot has not come off, anchor abreast of William Islets; but in daylight there is no danger in standing in to the entrance of Stanley Harbour. The above directions are for westerly winds, which generally prevail.

Coming from the northward, with westerly winds, make Cape Carysfort, or with easterly winds, Volunteer Point. When they are passed, steer for Cape Pembroke, on which the lighthouse will be seen, until Port William opens to starboard, when run in and anchor, or wait for a pilot, according to the above directions.

In case of darkness or fog, ships may anchor in the mouth of Berkeley Sound or of Port William, or stand off and on, as may be expedient, there being no danger that is not buoyed by the kelp.

Wolf Rock bears from Cape Pembroke lighthouse S. ¾ W. by compass, distant nearly 3 miles. It is of a triangular shape, each side being about 3 cables in length.

Seal Rocks lie about three-quarters of a mile N.E. from Cape Pembroke, and are clean on all sides. The tide runs North and South about 3 knots between Cape Pembroke and Seal Rocks, the flood setting to the northward, and the ebb to the southward.

Billy Rock is 4½ cables N. by E. ½ E. from Cape Pembroke lighthouse, and as it is covered at high water, caution is necessary when in its vicinity.

Capt. Isaac Paddle, of the ***Monarch***, 1,444 tons burthen, who visited Stanley in 1872, says:—

"If a ship requires provisions and water only, it is advisable not to enter Stanley Harbour, but anchor just outside the Narrows. You can use your own boat, or hire one from the shore, to attend upon the ship.

"Stanley Harbour is landlocked, a perfect basin, and a pretty little place. You must have a fair wind to sail in or out, the entrance being narrow. When inside, steer for the hulk you intend laying alongside; bring up with your starboard bower. Veer away about 45 or 50 fathoms, and lash with good warps and springs alongside; by so doing you avoid sometimes two or three days' detention: if it comes on to blow hard, it is tedious to warp up. There are several hulks belonging to Mr. Dean and the Falkland Islands Company. I discharged about 450 tons into the hulk *Charles Cooper*. My total expenses were only £350. The cargo is entirely under your own charge. The heavy expenses of landing, warehousing, and transhipping are avoided.

"Move out of Stanley Harbour with the first fair wind, and anchor just outside the Narrows, even though your repairs are not quite finished, as it blows strong right in for several days, which might cause you much detention. You can finish and get your ship ready for sea outside."

It is high water, full and change, at 5^h 30^m. Spring tides rise 4 to 7 ft.

The other parts of the Falkland Islands do not need such particular description as the preceding, as they, without exception, have no importance, except as places of stopping, or as anchorages. It may be remarked that, with the exception of the above, none of the ports on the S.E. side should be attempted except in good daylight, when the kelp, the only invariable guide, can be seen. In general, by avoiding this, you avoid danger, but not always so: where the kelp does not grow, the shallow sand may be plainly seen from aloft.

Port Harriet is 5½ miles to the S.W. of Cape Pembroke; it is swampy, and of no importance, but affords excellent anchorage a quarter of a mile N.N.W. of the south-eastern point, in 6 or 7 fathoms, just outside a small patch of kelp, with 8 fathoms least water, lying nearly in mid-channel. *Port FitzRoy* is 8 miles beyond this, and there is no danger between it and *Beach Point*, for 4 miles beyond which there are numerous kelp patches. The best entrance from the East is to the northward of all these, keeping close to the kelp on the main shore. *Fitz Basin*, large and shallow, like the *North Basin*, is entered through a remarkable gorge on the North shore. *Port Pleasant* is immediately South of it. It has two entrances, formed by a narrow island, the northern of which is the best, carrying 2½ fathoms. It is difficult to make out the entrances of Ports Pleasant and FitzRoy from the sea.

Choiseul Sound is entered between *Fox Point*, the southern extremity of a long white sandy beach, with a small dark islet off it, and 9 miles from Pleasant Road, and *Lively Island* on the South. It extends 26 miles from East to West, is 4 miles broad at its entrance, gradually becoming narrower towards its head, and terminating in a long narrow inlet called Bodie Creek, which runs 4 miles westward of the head of the Sound. The head of Brenton Sound, which runs southward out of Falkland Sound, reaches within about a mile of its upper portion, forming a narrow isthmus connecting the southern and northern peninsulas. The whole of Choiseul Sound is studded with islands, which form excellent and well-sheltered anchorages for small vessels. Large ships can bring up in any part of the Sound in from 12 to 18 fathoms water; the bottom is all mud, covered with shells and weed. The best entrance to the Sound is to the northward of *Middle Island* in the entrance, between it and the two black rocks, which are several feet high, and half a mile from the North shore. *Mare Harbour*, one of the finest on the coast, and easily accessible for the largest ships, is on the North side after passing the entrance. On the South side of the Sound is a large inlet called *Victoria Harbour*, affording good anchorage for large ships. There is but little tide in the Sound.

LAFONIA, as the southern peninsula has been named from the purchaser, Mr. S. Lafone, is, as just stated, limited by Choiseul Sound on the East side, and Brenton Sound on the West. The original projector of this colonization transferred his rights to the Falkland Islands Company, as stated in the introductory remarks to this section.

Lively Sound, on the West side of Lively Island, has good anchorage for a vessel for the night to the northward of Motley Island. *Seal Cove*, which lies at the head of it, is one of the best spots for a settlement, should one be formed in this part of the Falklands, and it is also the best place for ships to remain any time. *Seal Island* is the best guide to it, and there is plenty of room for a square-rigged vessel round to the North of it. *Low Bay* has its entrance between *Trist Islands* and the North part of Bleaker or Long Island. It is indented with several bays, and though it has an inviting appearance, is not an advisable anchorage, having many foul patches. The character of East Falkland hereabout and to the southward is low, few places having a greater elevation than 150 ft.

Adventure Sound is 20 miles in length from Bleaker Island to its N.W. extremity, and its greatest breadth is between 3 and 4 miles. It contains several good harbours, and various creeks and coves; those on its S.W. side are to be preferred, the two best being Adventure Harbour and Moffat Bay. *Adventure Harbour* is reached after passing round Bleaker and North Point Islands, by a W.S.W. course, 4 miles to *Little Island*, a small, dark-looking mound of tussac, from whence a S.S.W. course 3½ miles more leads clear of all dangers to the harbour. This fine harbour is fit for vessels of any class, and abundance of fresh water is to be had. *Moffat Bay* is 1½ mile to the southward of it. *Barrow Head*, to the N.W., is 6 miles S.W. by W. ½ W. from *Turn Island*, on the N.W. side of the entrance to the Sound. It has good anchorage and natural supplies. *Fox Harbour*, the next northward, is not so good, and *Sulivan Harbour*, near the head, has good anchorage. *Shag Rock*, lying 6½ miles off the East coast of Bleaker Island, is an excellent guide when running from the southward for either Lively or Adventure Sounds. The time of high water is 5½^{h}; springs rise 5 to 6 ft.

The Bay of Harbours is 7 miles wide between Cow Point and Bull Point, but nearly midway is Middle Shoal, with a rock awash at low water. *Bull Road*, in its S.W. part, is by far the most convenient anchorage in the southern part of East Falkland. The largest ships can work into it, and are completely sheltered close to the shore on the South side of the bay, off the entrance to Bull Cove. The guide for Bull Road is to make Bull Point, which is low, and off which there is a rocky islet surrounded by kelp. Follow the edge of this kelp to the N.W., and it will lead into the road. *Fanny Road* is the only other advisable anchorage on the West side; no directions are necessary for it.

Eagle Passage, to the S.W. of the East Falkland, is not to be recommended to large vessels. There is a tide race through it of 3 knots, and there are several reefs in its S.E. part. The south-western limit of the passage is formed by Barren, George, and Speedwell or Eagle Islands.

Barren and *George Islands* are the southernmost, and between them there is good anchorage for any vessels, called *Owen Road;* but in coming into it from the eastward, care must be taken not to pass nearer to Barren Island than 2 miles, as reefs run off at least that distance in a north-easterly direction.

Speedwell or *Eagle Island*, to the northward of George Island, is the largest of the group. It is flat, and not more than 70 ft. high. Fresh water and game abound on it, and drift wood on its western side. There are two good anchorages for small vessels on its N.E. side. To the N.W. of it are the *Elephant Cays*, low sandy islets surrounded by reefs and kelp, and no passage inside them.

Sea Lion Islands, which lie to the S.E. of this, afford good means of distinguishing the entrances to the various harbours on the coast, but a better still is *Shag Rock*, before mentioned, a high peaked mass off the entrance to Adventure Sound. The low land around all these harbours is so much alike, that a stranger cannot distinguish them, except by the relative bearings of these more easily distinguishable parts. There is a passage to the East of the larger Sea Lion Island, between it and the kelp, surrounded by a ridge eastward of it; but a long reef, which breaks heavily, extends 3 miles to the southward of that island, for which a good look-out must be kept in running for the opening.

The tide sets to the westward during the flood along the whole South shore of East Falkland. It sets 1 to 2 knots, but near Porpoise Point it reaches 3 knots, and with westerly gales forms a strong race. The tide turns with high water by the shore, which is at 6^h 10^m, full and change.

FALKLAND SOUND is a narrow strait which separates the two main islands, and is 45 miles long in a northerly and southerly direction, and varying in breadth from 15 to 2½ miles. In its southern end there are many flat islands clothed with tussac, and some shoals; the dangers are, however, generally visible. It ought not to be navigated at night; and as good anchorage may be obtained in almost every part of it, and good harbours abound, a safe position may always be selected before dark, and its navigation is easy. The tides in both entrances and between the islands are strong, but in the main stream they are moderate. Vessels at either extremity of the Sound, intending to proceed to sea, should the day be at all advanced, would do well to anchor for the night, and start at daylight, as in that case they would have the whole day to get clear of the entrances, and thus save some anxiety and risk, as the wind generally becomes lighter after sunset. The ports in Falkland Sound need but little direction; the shoals are all buoyed by kelp.

The eastern side of the Sound from the South end up to the N.W. islets, the western side of the peninsula of Lafonia, is a low country, with gently undulating hills, seldom exceeding 150 ft. in height; the shore indented with excellent harbours. The western side, on the contrary, is high and bold, forming a singular ridge, varying from 300 to 500 ft. high, nearly the whole length of the Sound, but reft asunder in three places, forming Port Howard, Shag Harbour, and Hill Gap. These gaps or fissures form excellent guides to the harbours on the opposite or flat side of the Sound.

Ruggles Bay, at the S.E. end, is abreast of the Calista Islands. The passage to it is between Ruggles and Wolf Islands. Excellent anchorage may be had in it in *Danson* and *Moffat Harbours*. Inside of the *Tyssen Islands*, North of this, are *Findlay*, *Wharton*, *King*, and *Cygnet Harbours*, all excellent and secure, especially the three first. *Newhaven* is a little port well suited to small vessels on the South side of *Grantham Sound*.

Brenton Loch, an inlet with a narrow entrance to the eastward of Newhaven, extends 9 miles from its mouth close up to the head of Choiseul Sound, which thus peninsulates the southern portion of East Falkland. The navigation of Brenton Loch is impeded by several rocks and shoals, but it is admirably sheltered, and is apparently a great resort for seals. *Port Sussex*, to the North of this, is a snug and good harbour; the best anchorage is on the South side. It is an excellent port for careening and refitting.

Port San Carlos, near the North end of the Sound, is one of the finest harbours in the Falklands, being capacious, secure, and clear of all dangers. Tame cattle and geese abound in the neighbourhood; plenty of fuel and water may be had. Off the entrance of this is the northern and narrowest entrance to Falkland Sound. Between Race Point and Cape Dolphin lie *Foul* and *Middle Bays*, which present no inducement to enter. There is a shoal about three-quarters of a mile S.W. of Cape Dolphin.

Eddystone Rock, which is 4 miles N.W. by W. ½ W. of Cape Dolphin, is an excellent mark for the northern entrance to the Sound. It is well seen from a vessel's deck at 8 miles off, and, when at that distance, exactly resembles a ship under all sail.

Port Salvador, on the North side of the East Falkland, is difficult to enter, on account of its long and narrow channel and the rapidity of the tides, but when inside good and secure anchorage abounds all over the port, and all dangers, except two shoals of 2 fathoms, are visible.

In making for the North entrance to Falkland Sound, steer for *Fanny Head*, the high double peak (600 ft.) on the eastern side of the entrance; or, if it be obscured, make a S. by E. course from the Eddystone Rock, until within a couple of miles of Race Point, when the eastern shore must be kept on board to avoid *Tide Rock*, *Awash Rock*, and *Sunk Rock*. The two latter are lurking dangers, but as Tide Rock shows itself and is steep-to, it forms a good guide to avoid the others, by never bringing it to bear to the eastward of South.

White Rock Bay, at the N.W. entrance of the Sound, is an excellent port, and can be left or entered with any wind. *Manybranch Harbour* will only admit fore-and-aft craft, in consequence of its narrow and crooked entrance. *Port Howard* has also a narrow entrance, but the harbour widens out immediately inside the heads, and is very secure. A vessel would shoot well in by keeping close round the South head with the wind to the southward of West. *Shag Harbour* is only fit for small vessels. *Fox Bay* is wild, and exposed with South winds to a heavy sea, but has a good retreat in its northern arm.

Port Edgar is easily known after making Cape Meredith, or Arch Islands to the southward, and it is the nearest opening westward of Fox Bay. The bluff and very narrow entrance renders it very difficult to enter with the wind northerly, and when it is between South and West it is very baffling and squally. Therefore good way should be kept on the vessel and the western shore well closed, even to the edge of the kelp. By these means a vessel may shoot past the heads and inside the harbour, which for security is second to none. There is but little tide in its entrance.

Port Albemarle may be entered from either side of Arch Islands, but the water is inconveniently deep in the roads. There is good anchorage in Lucas Bay, but the anchorage among Arch Islands is preferred by the whalers to that of Port Albemarle, from being nearer to the open sea, and with less depth of water. *Albemarle Rock*, which is a good guide to the port, is bold, upright, and about 150 ft. high, saddle shaped, and whitened by birds. Arch Islands are remarkably rugged, with upright light-coloured cliffs, and have a natural archway, through which a boat can pass at the West end of the largest island.

Port Stephens is the first port to the westward of Cape Meredith, the southernmost point of the islands. The land is very remarkable. Bird Island and the Castle Rock lie to the westward of the port, and a notable hill, called the Three Crowns, with three distinct masses of bare rock, lies to the south-eastward. Stephens Bluff is a remarkably cliffy head, appearing like an island, and its outer part is very similar to Castle Rock. The entrance is 400 yards wide, and all its dangers buoyed by kelp. Port Stephens is not easily quitted except with a fair wind, particularly after a southerly breeze. There is good anchorage between Stephens Bluff and Pea Point.

Rodney Cove is the only place of shelter between this and Cape Orford, and is a good and secure anchorage, but can only be entered with a leading wind. Cape Orford, which forms the South entrance point to *Smylie Channel*, is cliffy, about 100 ft. high, with a small island called the *Sea Dog*, in the offing. There is a heavy tide-run in Smylie Channel with westerly winds. When inside this entrance, two openings will be seen on either side of *Dyke Island;* the northern one leading into Queen Charlotte Bay, the other into *South Harbour*, in every part of which there is good anchorage for the largest ships.

There are numerous anchorages in the channels between *Beaver* and *Weddell Islands*. But as all of these channels are too intricate to be generally used, little need be said of them. The best anchorage is in Beaver Harbour, on the East side of Beaver Island. This channel and the kelp will be the best guide to it.

New Island, &c.—From the South entrance of West Point Harbour New Island lies S.S.W. 22 miles distant, and upon the eastern side of this island is *Coffin* or *Ship Harbour*. New Island is mountainous, and its western side presents a range of frightful precipices, one of which is 550 ft. above the sea, which in westerly storms beats against its base with extraordinary violence. The eastern side, on the contrary, falls sloping into points forming bays, and of these Coffin Harbour is the third from the South.

On coming from the westward, in lat. 51° 42′, New Island may be readily distinguished by its being the most northerly large island of that cluster, and by two islets lying off its North end, called Saddle Isle and North Head. Between these and the North end of New Island is a clear passage, but in which, during strong winds, the tide ripples violently.

Coffin Harbour, being the preferable anchorage, is the most to be recommended. In proceeding to it with a strong westerly wind, on rounding the North end of New Island, the sail on the ship should be particularly attended to, as the gusts of wind off the high land blow with great violence. With the wind at S.W. the South passage may be chosen; but it is to be noticed that a cluster, called Seal Rocks, lie off the South end of the island, between which and the rocks is the best passage; and by keeping without the edge of the kelp, which extends to a short distance from the end of the island, there is no danger.

The small round isles on the eastern side of New Island have good channels within, and between them Ship Harbour may be easily recognised by its having a small isle, Ship Island, in it. Behind this is the best anchorage, in 7 fathoms, on a bottom of stiff clay, with the South point of Ship Island bearing S.E., covering the S.E. point of the bay. The anchorage is perfectly landlocked.

Good water may be obtained at a sandy beach abreast of the anchorage, but it should be taken at 8 or 10 yards higher than the present pool on the bank, otherwise it may be brackish and undrinkable. Excellent peat is abundant, especially on Ship Isle. In order to get it dry, it is necessary to pull it from the sides of the pit, not very deep; and as there are several peat holes, by working them alternately, the material may be procured in a state fit for use.

Grey Channel, to the southward of New Island, is clear of all danger on either side of Seal Rocks, but the tides are strong, especially with westerly winds. If it should happen that a vessel cannot fetch New Island Harbour, she should not hesitate to bear up and run along the group of islands off the N.W. side of Weddell Island; she will soon make out *Bald Island*, on the N.W. side of Weddell Island, at the entrance of Chatham Harbour. It is small, round-topped, with a high cliff on its western side, and is close off *Beacon Point*, on which is a hill 300 ft. high, with a small stone beacon on it. Passing outside the Bald Island, anchorage may be reached in Bald Road, or in Chatham Harbour, in which Elephant Cove is the best place.

Port Richards, at the S.E. part of Queen Charlotte Bay, offers no very good anchorage, except in a cove on the North shore. Its head nearly joins the inner basin of Port Edgar. Vessels requiring anchorage here will find better in *Antony Creek*, or Carew Harbour, to the West of Port Richards. *Philomel Road* is on the northern side of Queen Charlotte Bay. On its northern side is Shallow Harbour, which may be known in coming from the westward by the steep bluff 2 miles West of it. A bright green tussac island lies abreast of the harbour, which may be passed close on its South side. The chart and kelp will be the best guides. At the N.E. end of the road a narrow channel, 6 miles long, leads to the splendid harbour of *Port Philomel;* but the tide is so strong in this channel that it is hardly safe but for small quick-working vessels to venture up it.

King George Bay and **Queen Charlotte Bay** are separated by a long narrow strip of land, off the extreme of which lie the four *Passage Islands*. The two eastern passages are very good, and clear of all danger. All the shores of the Passage Islands are steep, and there is no outlying danger but what shows plainly; but there is no good anchorage near them. King George Bay narrows *Christmas Harbour*, which one day is likely to be of much importance, as it leads to the heart of West Falkland. At its head there are creeks and large fresh-water streams, the largest of which is the *Chartres River*, running through some of the best watered land of the whole group. The entrance to it is well marked by *Town Point*, which, after a vessel has passed *Hummock Island*, appears as if covered with scattered houses, an appearance caused by numerous patches of white sand. *Port North*, farther

North than this, is a deep bight with a moderate depth of water, but rather exposed to West and S.W. gales.

West Point Harbour.—The next principal entrance to Port Egmont is *West Point Harbour*, at the western extremity of the southern land of Byron's Sound. There are two passages into it, one on the North and the other on the South. *Jason Islands*, lying to the N.W., are much in the way of the former; and these islands must be cautiously avoided in the night and in unsettled weather, as the tide runs so strong and irregular amongst them as to render a ship almost unmanageable.

The southern passage to West Point Harbour is easily made, by being careful, when coming from the westward, to haul close round West Point Island, so as to enter with it on the port side, for, by neglecting this precaution, with the wind from the westward, you may fall to leeward of the passage, and find it difficult to work out of the lee-bays, into which a heavy sea frequently rolls. The latitude of the anchorage here, according to Capt. Weddell, is 51° 24′ 15″, and the longitude about 60° 51′.

The best anchorage in West Point Harbour is abreast of a small cove on the South side, in 5 fathoms, over a bottom of sand and mud. The stream of tide is here scarcely perceptible, although it rises about 9 ft. by the shore, and flows, on full and change days, at $7^h\ 30^m$. Water may be obtained at the head of the cove; and at the head of the harbour there is also a run of water, in which mullets may be caught by constructing a fish weir. Water is abundant during the spring and autumn, not only here, but at Beaver Island, to the S.W., and at Little Port Egmont, in the West side of the passage to the greater port of the same name.

At the West end of West Point Island is a rookery of the small albatross, which in October affords a good supply of eggs. Some brushwood grows round the cove, but it is too small to be useful.

In proceeding through the Gut of West Point from the southward, with ebb tide, which runs to the N.E. with great rapidity, the great harbour, when opened, must be hastily entered, in order to avoid being swept to the northward by the stream.

PORT EGMONT.—The entrance of Port Egmont, on the North side of the Great Island, may be descried at some distance from the sea, and may be entered by steering S.E. by S., which will lead in safely. On advancing, you will pass two rocky islets, which lie about 9 miles N.N.W. from the entrance; by passing within half a mile of the western side of these, the course in will be about S.S.E. ½ E.

Captain Weddell has observed, that the site of the English settlement at this port was certainly ill chosen. The ruins of part of the town still remain standing, on the South side of a mountain not less than 600 ft. high. The settlers, it appeared, had extended their gardens to the westward of this mountain, so that, during the winter, the solar rays must have been almost lost to them during the greater part of the day.

The harbour is spacious, even to a fault, for its great size, during strong winds, renders communication with the shore inconvenient. The best anchorage is immediately off the creek at the foot of the ruins, bearing N.N.W., in 9 fathoms of water, about three-quarters of a mile from the shore. A reef extends from the East point of the creek, but may be known by the kelp which grows upon it. The ground is, however, so tough that the anchor will not be raised without great labour.

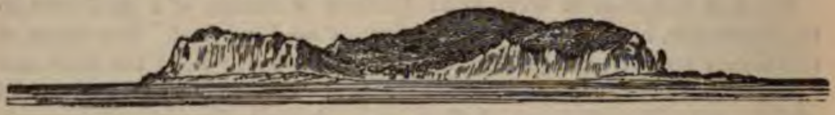
The best *watering-place* in this port is at the head of the creek, and the most expeditious method of obtaining water is to fill the casks at low-water mark, and raft them off to the vessel. Fuel may be obtained by digging peat, about 100 yards above the top of the creek, but it requires drying, and is not so good as that found at some other places.

The tide, on the full and change, flows at $7^h\ 10^m$, and rises about 9 ft.

Tamar Harbour, to the eastward of Port Egmont, is not a good harbour, as the entrance is narrow, rapid tides prevail through it, and there are rocks in the passage.

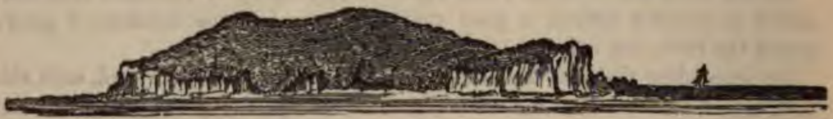
Pebble Sound, lying between Port Egmont and Tamar Harbour, is studded with islands, which would render its navigation difficult to strangers.

BEAUCHENE ISLAND, lying about 21 miles to the southward of the Eastern Falkland, is uninhabited. We give the appearance annexed from sketches taken by Mr. D. Lye, Master, R.N.

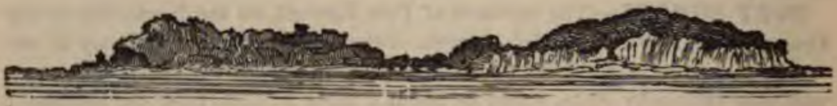


Beauchêne Island, W. by N. ½ N. 4 miles.

The name of the island is from that of the French navigator Beauchesne Gouin, who discovered it in 1699, and which was soon after given in the charts.



Beauchêne Island, bearing North, 4 or 5 miles.



Beauchêne Island, N.W. 4 miles.

Capt. FitzRoy approached Beauchêne Island on the 9th of March, 1834: he says, "Many persons have fancied that there are two islands near together in that place, having been deceived by two hummocks on the only island, which from a distance show just above the horizon like two islets." It is in lat. 52° 54′ 45″ S., long. 59° 12′ W.

Captain George Mintey, when on his passage from Liverpool to Lima, August 15th, 1841, the ship under his command struck on a *sunken rock* to the southward of Beauchêne, the compass and binnacle being washed away from the deck. As near as could be judged from the direction of the ship's head by a compass in the cabin, it bore S.S.W., distant about 3½ miles.

14.—BURDWOOD BANK.

This extensive bank of deep water soundings is above 250 miles in length from West to East, and extends on the parallel of Staten Island nearly to longitude 55° W. It was explored by Sir James Ross in his Antarctic voyage, and its limits and character more fully ascertained by Capt. Sulivan and others, as exhibited on the chart.

The original account from which this bank derives its name is of a different nature, as it is an *islet* which was announced, but, it need scarcely be stated, that the existence of this has been disproved by the examinations above alluded to. In our former editions the following notice appeared of this *doubtful* Kains Islet.

The *Kains* transport, Lieut. T. Burdwood, agent, in her passage from Rio Janeiro to Valparaiso, in November, 1828, is said to have passed a rocky islet in lat. 54° 9′ S., long. 59° 36′ W. The existence of such a rock had been reported by the Spaniards in 1813, but was considered as doubtful. It is stated that Lieut. Burdwood had the satisfaction of having his observations corroborated by a mercantile commander, according to whom it would lie about 120 miles South from the Falkland Isles.

Captain Sir James Ross struck soundings about the eastern extremity of the bank in lat. 54° 41′ S., long. 55° 12′ W., in 280 fathoms, coarse black sand and small volcanic stones. He subsequently made a closer examination, as is stated in the following extract:—

On Nov. 11, 1842, in lat. 54° 18′ S., long. 60° W., he obtained soundings in 50 fathoms, but could not see the rock nor any appearance of broken water, although the weather was clear, and the sea sufficiently rough for breakers to be visible at a considerable distance. The remainder of the day was spent in sounding and surveying the Burdwood Bank, which was traced between 12 and 13 miles to the eastward. The least depth of water found was 24 fathoms, the shoal forming a narrow ridge of volcanic rock, lying nearly East and West, the soundings rapidly increasing in depth on either side of the ridge, and consisting of coarse sand, small stones and shells. The colour of the sea was observed to be of a deep brown over the bank; some dark patches of seaweed (*macrocystus*) were seen as it was approached, and the line of the bank was marked by a rough ripple on the surface. Ten miles to the northward the depth was 80 fathoms, on fine black sand, and 30 miles farther to the North there was no bottom with 300 fathoms.—*Sir James Ross*, Vol. I, pp. 281, 315.

15.—SOUTH GEORGIA.

South Georgia was discovered by Antony La Roche in 1675, and explored by Captain Cook in 1775, who gives the following description :—

" At 9^h a.m. (Jan. 14) we saw an island of ice, as we then thought, but at noon were doubtful whether it was ice or land. At this time it bore E. ¾ S., distant 13 leagues. Our lat. 53° 56½′, long. 39° 24′ W. Several penguins, small divers, a snow petrel, and a vast number of blue petrels about the ship.

We had but little wind all the morning, and at 2ʰ p.m. it fell calm. It was now no longer doubted that it was land, and not ice, which we had in sight. It was, however, in a manner wholly covered with snow. We were further confirmed in our judgment of its being land by finding soundings at 175 fathoms, a muddy bottom.

"At 4ʰ in the morning of the 16th we wore and stood to the East, with the wind at S.S.E., a moderate breeze, and fair: at 8ʰ saw the land, extending from E. by N. to N.E. by N. At noon observed in lat. 54° 25½′, long. 38° 18′. In this situation we had 110 fathoms of water, and the land extending N. ½ W. to East, 8 leagues distant. The northern extremity was the same that we first discovered, and it proved to be an island, which obtained the name of Willis's Island, after the person who first saw it.

"At this time we had a great swell from the South, an indication that no land was near us in that direction; nevertheless, the vast quantity of snow on that in sight induced us to think it was extensive, and I chose to begin with exploring the northern coast. With this view we bore up for Willis's Island, all sails set, having a fine gale at S.S.W. As we advanced to the North we perceived another isle, lying East of Willis's, and between it and the main. Seeing there was a clear passage between the two isles, we steered for it; and at 5ʰ, being in the middle of it, we found it about 2 miles broad.

"Willis's Isle is a high rock, of no great extent, near to which are some rocky islets. It is situated in lat. 54° S., long. 38° 23′ W. The other isle, which obtained the name of Bird Isle, on account of the vast number that were upon it, is not so high, but of greater extent, and is close to the N.E. point of the main land, which I called Cape North.

"The S.E. coast of this land, as far as we saw, lies in the direction of S. 50° E. and N. 50° W. It seemed to form several bays or inlets; and we observed large masses of snow or ice in the bottoms of them, especially in one which lies 9 miles to the S.S.E. of Bird Isle.

"After getting through the passage, we found the North coast trended E. by N. for about 9 miles, and then East and East-southerly to Cape Buller, which is 11 miles more. We ranged the coast at 1 league distance, till near 10ʰ, when we brought-to for the night, and on sounding found 50 fathoms, a muddy bottom."

Captain Cook proceeded to examine the eastern coast, and took formal possession of the land. The tide seemed to rise about 4 or 5 ft.; high water at about 11ʰ, full and change. The head of Possession Bay, as well as two places on each side, was terminated by perpendicular ice cliffs of considerable height. Pieces were continually breaking off with a loud explosion, and floating out to sea.

"The inner parts of the country were not less savage and horrible. The only vegetation we met with was a coarse strong-bladed grass, growing in tufts, wild burnet, and a plant like moss, which sprang from the rocks. Seals were numerous. Several flocks of large penguins were seen. The oceanic birds were albatrosses, common gulls, terns, shags, divers, &c. The land birds were a few small larks. No quadruped was seen.

"Cooper's Isle, at the S.E. end of Georgia, is a rock of considerable height, about 5 miles in circuit, and 1 mile from the main. At this isle the main coast takes a S.W. direction, for the space of 4 or 5 leagues, to the point named

Cape Disappointment. Off that are three small isles, the southernmost of which is green, low, and flat, and lies 1 league from the cape.

"The island seems to abound with bays and harbours, the N.E. coast especially, but the vast quantity of ice must render them inaccessible for the greater part of the year; or at least it must be dangerous lying in them, on account of the breaking up of the ice cliffs. It is remarkable that we did not see a river, or stream of fresh water, on the whole coast. I think it highly probable that there are no perennial springs in the country; and that the interior parts, as being much elevated, never enjoy heat enough to melt the snow in such quantities as to produce a river or stream of water."

Clerke's Rocks are three or four rocky islets, lying about 35 miles E. by S. from the S.E. end of South Georgia, which were subsequently seen at the distance of 2 or 3 miles. Vast numbers of birds, especially shags, were seen about them.

South Georgia was visited by Captain Weddell, on his return from the southward, in March, 1823. On the 12th, at 3^h p.m., the *Jane* and *Beaufoy* anchored in *Adventure Bay*, on the S.W. side of the island, in 7 fathoms, bottom of strong clay.

The arrival, though not to a country the most indulgent, was considered to be a very happy event. "Our sailors had suffered much from cold, fogs, and wet during the two months they had been navigating the South; and as we had been nearly five months under sail, the appearance of scurvy (that disease so fatally attendant on long voyages) was to be dreaded. Our vessels, too, were so much weather-beaten, that they greatly needed refitting; so that, taking into account our many pressing wants, this island, though inhospitable, was capable of affording us great relief.

"Our crews here fed plenteously on greens, which although bitter, are very salutary, being an excellent anti-scorbutic. With regard to meat, we were supplied with young albatrosses, that is to say, about a year old; the flesh of these is sweet, but not sufficiently firm to be compared with that of any domestic fowl.

"Our harbour duties, and a search upon the island for animals for our cargo, were immediately commenced, and carried on with zeal, although we experienced frequent interruptions from heavy gales, which were now prevalent, it being near the time of the autumnal equinox of this hemisphere.

"I took opportunities of making various observations on shore, and found the head of the bay to lie in lat. 54° 2′ 48″, and in long., by the mean of two of the best of my chronometers, 38° 8′ 4″. The variation of the compass, at the same place, by azimuth, was 11° 15′ East.

"The head of this bay being surrounded with mountains, I ascended the top of one of them for the purpose of taking the altitude of the sun when at some distance from the meridian; but, after planting my artificial horizon, I was surprised to find that, although there was not a breath of wind, and everything around perfectly still, yet the mercury had so tremulous a motion that I could not get an observation. The ground was evidently agitated internally, though it was only by means of the quicksilver that I could detect it.

"On the 17th of April, our harbour business being completed, both vessels put to sea, and, with the wind at East, we directed our course toward the Falkland Islands.

"I need not remind the reader of the great advantages navigation and geography in general have acquired from the discoveries and investigations of that able navigator Capt. Cook; but the public may not be aware of the great extent to which his researches in the South, in particular, have been beneficial to Great Britain.

"His official report regarding the island South Georgia, in which he gave an account of the great number of sea elephants (called by him sea lions), and fur seals, found on the shores, induced several enterprising merchants to fit out vessels to take them—the elephants for their oil, and the seals for their skins. These animals are now almost extinct; but I have been credibly informed that, since the year in which they were known to be so abundant, not less than 20,000 tuns of sea elephant oil has been procured for the London market. A quantity of fur seal skins were usually brought along with the cargo of oil; but formerly the furriers of England had not the method of dressing them, on which account they were of so little value as to be almost neglected.

"At the same time, however, the Americans were carrying from South Georgia cargoes of these skins to China, where they frequently obtained a price of from 5 to 6 dollars a-piece. It is generally known that the English did not enjoy the same privilege, by which means the Americans took entirely out of their hands this valuable article of trade.

"The number of skins brought off from South Georgia, by ourselves and foreigners, cannot be estimated at fewer than 1,200,000. I may here also remark, that the Island of Desolation [Kerguelen's Land], which Capt. Cook likewise visited and made known, has been a source of scarcely less profit than South Georgia. Hence it may be presumed that, during the time these two islands have been resorted to for the purpose of trade, more than 2,000 tons of shipping, and from 200 to 300 seamen, have been employed annually in this traffic."

Capt. Weddell gives his description of South Georgia as follows:—

"The island is about 96 miles long, and its mean breadth about 10 miles. It is so indented with bays, that in several places, where they are on opposite sides, they are so deep as to make the distance from the one side to the other very small. Near the West end, in particular, there is a neck of this kind, about half a mile broad, over which boats are frequently transported.

"The tops of the mountains are lofty, and perpetually covered with snow; but in the valleys, during the summer season, vegetation is rather abundant. Almost the only natural production of the soil is a strong bladed grass, as before mentioned, the length of which is, in general, about 2 ft.; it grows in tufts, on mounds 3 or 4 ft. from the ground.

"No land quadrupeds are found here; birds and amphibious animals are the only inhabitants. Of the bird tribe, the king penguin is the most worthy of notice."

16. THE SANDWICH LANDS.

This is a group of eight volcanic islands, consisting of barren black rocks, some very high, covered with ice and snow; they occupy a space of about 200 miles North and South, and in 1823 nine active volcanoes were observed by Capt. Morrell, of the *Wasp*.

Mr. Pinkerton says, "These lands may be styled the *Southern Throne of Winter*, being a mass of black rocks, covered with ice and snow." They were discovered by Capt. Cook in 1775, on proceeding to the south-eastward from South Georgia. From the lat. of 59° 30′ S., long. 29° 24′ W., the ship stood to the N.E., with a fresh breeze at N.N.W., and passed one of the largest ice islands seen on the voyage, with several smaller. The weather was foggy, with sleet; and, with the wind North by West, she stood to N.E. over a sea strewed with ice.

"At 6^h 30^m next morning, as we were standing N.N.E., with the wind at West, the fog very fortunately clearing away a little, we discovered land ahead, 3 or 4 miles distant. On this we hauled the wind to the North; but finding that we could not weather the land on this tack, we soon after tacked in 175 fathoms of water, 3 miles from the shore, and about half a league from some breakers. The weather then cleared up a little more, and gave us a tolerably good sight of the land. That which we had fallen in with proved to be three rocky islets of considerable height. The outermost terminated in a lofty peak like a sugarloaf, and obtained the name of Freezeland Peak, after the man who first discovered it. Behind this peak—that is, to the East of it—appeared an elevated coast, whose lofty snow-clad summits were seen above the clouds. It extended from N. by E. to E.S.E., and I called it Cape Bristol, in honour of the noble family of Hervey. At the same time another elevated coast appeared in sight, bearing S.W. by S., and at noon it extended from S.E. to S.S.W., from 4 to 8 leagues distant; at this time the observed lat. was 59° 13½′ S., long. 27° 45′ W. I called this land *Southern Thule*, because it is the most southern land that has yet been discovered. It shows a surface of vast height, and is everywhere covered with snow. Some thought they saw land in the space between Thule and Cape Bristol. It is more than probable that these two lands are connected, and that this space is a deep bay, which I called Foster's Bay.

"At 1^h, finding that we could not weather Thule, we tacked and stood to the North; and, at 4^h, Freezeland Peak bore East, distant 3 or 4 leagues. Soon after, it fell little wind, and we were left to the mercy of a great westerly swell, which set right upon the shore. We sounded, but a line of 200 fathoms found no bottom. At 8^h the weather, which had been very hazy, clearing up, we saw Cape Bristol bearing E.S.E., and terminating in a point to the North, beyond which we could see no land. This discovery relieved us from the fear of being carried by the swell on the most horrible coast in the world, and we continued to stand to the North."

In this manner the other points were discovered: but the cliffs alone were all which was to be seen like land.

On the 2nd of February the Candlemas Isles were seen. They appeared to be of no great extent, but of considerable height, and covered with snow. A small rock was seen between them, and perhaps there may be more; for the weather was so hazy that the sight of them was soon lost. At noon, on the 3rd, the ship was in lat. 56° 44′ S., long. 25° 33′ W., and was attempting to stand to the South, but a shift of wind made it necessary to tack, and proceed to the eastward. On this course several ice islands and some loose ice were met with.

In closing his remarks on these lands, Capt. Cook adds, "I concluded that what we had seen, which I named Sandwich Land, was either a group of islands, or else a point of the continent. For I firmly believe that there is a tract of land near the pole which is the source of most of the ice that is spread over this vast Southern Ocean. I also think it probable that it extends farthest to the North, opposite the Southern Atlantic and Indian Oceans, because ice was always found by us farther to the North in these oceans than anywhere else, which I judge could not be if there were not land to the South—I mean a land of considerable extent."

Routes South-Eastward of the Sandwich Lands.

Capt. Biscoe has satisfactorily proved the Sandwich Land of Capt. Cook to be a group of islands, as will be shown by the following extracts from his journal. This gentleman commanded the brig *Tula*, belonging to Messrs. Enderby, and left the port of London, on a South Sea sealing voyage, July 14th, 1830, but with special instructions from her owners to endeavour to make discoveries in a high southern latitude. The brig was liberally equipped, and accompanied by the cutter *Lively* as a tender.

After touching at the Cape Verde Islands for salt, the two vessels arrived off the Falkland Islands on the 8th of November, and anchored in Port Louis, Berkeley Sound, on the 10th. Capt. Biscoe speaks highly of the convenience of this port for vessels bound round Cape Horn; as fish, bullocks, and fresh water, &c., can be so easily procured. On the 27th they again proceeded to sea, and on their way kept a vigilant look-out for the Auroras, as we have before noticed. On the 10th of December many icebergs were seen. On the 20th an island was made, which proved to be the *Montagu Land* of Capt. Cook, a terrific rock, covered with ice, snow, and heavy clouds; and subsequently other points of these islands were seen, as shown on the chart. These are placed by Capt. Biscoe about 50′ to the West of the longitudes given by Capt. Cook. The thermometer here stood at 29° in the air, and 31° in the water.

Several following days were spent in endeavouring to get to the southward, and, if possible, also to the westward, there being strong indications of land in that quarter; but these were all unsuccessful. The field ice was either quite continuous and unbroken, or where bays were formed in it, and entered, these were found open but a little way, and the vessels were obliged to return as they went in. Fortunately the water was remarkably smooth, even when the wind, which hung to the westward, blew strong; and this circumstance both facilitated the manœuvring of the vessels, and encouraged their crews to persevere, by confirming their surmises as to the existence of land in the neighbourhood. On the 29th of December, at noon, the lat. observed was 59° 11′, long. 24° 22′ W.; but as the wind was then blowing hard from the S.W., further investigation in that quarter was abandoned. The islands, before seen, were again sighted, and the longitudes of their centres being further determined, and confirmed to be about 27° W., sail was made to the eastward.

On the 5th of January, 1831, the *Tula* and her companion were in lat. 59° 9′, long. 21° 52′, closely skirting the field ice the whole way, and examining every inlet, in the hopes of finding a passage through it to the southward, and, as they hoped, to clear water. In this, however, they were constantly disappointed; and, on the contrary, on the evening of the 7th, Capt. Biscoe says, "my hopes in this direction were destroyed, for I suddenly found myself at the head of a bay of firm ice, with a view, from the mast-head, to an extent of at least 20 miles in every direction; and, to the southward, the ice appeared so smooth and firm, that any one might have walked on it. The weather, too, was now so clear, that, I am convinced, land of any considerable elevation might have been seen at 80 or 90 miles. What further astonished me was, that there were no living animals of any kind about this ice, with the exception of one or two small petrels, not even any penguins, which at other times had been very numerous. These circumstances almost convinced me that the ice must have been formed at sea, the temperature of the water being then 30°, and that of the air 31°, with frequent and very heavy falls of snow. Nevertheless there were strong indications of land in the S.W., though none was actually within our horizon, and the water continued very smooth."

17. SHAG ROCKS.

Shag Rocks are represented as existing in lat. 53° 48′ S., long. 43° 25′ W., and are said to be even with the water; but Capt. Weddell says, "this I believe not to be the case, as I have been credibly informed that they appear in three pinnacles, or in the shape of sugar-loaves, 60 or 70 ft. high, with a reef running around them. These reefs, I presume, may have given rise to the supposed existence of the Aurora Islands."

They were said to have been seen in the ship *Ellerslie*, at 9 a.m., April 2nd, 1855. The captain says they then bore W. by S. ¾ S., distant 5 miles, and showed three separate peaks, about the height of a ship's mast above the water. He adds, they could not be mistaken for icebergs (many of which were in view at the time), on account of their dark colour, and several very lofty icebergs were travelling past them, indicating a great depth of water around the rocks. More recently, Capt. Vaux, of the ship *Epsom*, sighted three black pinnacle rocks, bearing North and South of each other, about half a mile apart, and 150 ft. high; he places them in lat. 53° 40′ S., long. 43° 30′ W.

But it may be that these islands were merely icebergs, incorporated with earth similar to one seen by Capt. Weddell far to the southward.

18. POTTINGER'S BANK.

On the 5th of January, 1822, Capt. Pottinger, of the brig *Tartar*, of London, on his passage from South Georgia to South Shetland, passed over a bank in lat. 54° 36′ S., long. 57° 49′ W.; soundings, 65 fathoms, coral rocks, with sea eggs and shells. He supposed that he had passed over a considerable and much shoaler part of it before daylight, judging by the agitated state of the sea.

Capt. Fildes, to whom we owe this communication, says, "I saw some of the soundings that came up with the pitch-pot when trying the current, which was the way the bank was discovered; for, on letting down the pot, to their surprise they struck soundings."

19. SOUTH SHETLAND.

Capt. Cook's concluding remark, given in a preceding page, was verified, in some measure, by the discovery of the volcanic archipelago, now called South Shetland, which extends in a N.E. and S.W. direction for about 260 miles, being separated by deep channels, and surrounded by islets and rocks. For the first notices of this discovery the world is indebted to Mr. William Smith, commander of the brig *Williams*, of Blyth, by whom the land was first seen in the month of February, 1819. The *Williams* was at this time on a voyage from Buenos Ayres to Valparaiso, and stretching far to the South. On the 19th, land or ice was seen in lat. 62° 40′, and near long. 62° W., then bearing S.E. by S., about 6 miles. Hard gales, with flying showers of snow, and fields of ice—a combination of adverse circumstances—prevented at this time an exploration of the coast; and on the brig's return to the River Plata, in the month of May, similar circumstances prevented any further discovery; but on a subsequent voyage from Monte Video to Valparaiso, in October of the same year, the *Williams* again made the land. Capt. Smith, in his journal, says, "I, to my great satisfaction, discovered land on the 15th of October, at 6 p.m., in lat. 62° 30′, long. 60° W., by chronometer, distant about 3 leagues; hazy weather; bore up and sailed toward it; at 4 miles distant sounded in 40 fathoms, fine black sand; an island bearing E. by S. At S.E. by E. bearing, sounded in 60 fathoms, same bottom; hauled off during the night to the northward; at daylight stood in for the land again, at 3 leagues distance. From the body of the islands sounded again, 95 fathoms, fine sand and oaze; at 8^h, weather clear and pleasant, saw the main land bearing S.S.E., distance from the islands about 3 leagues. Having run as far as the cape, we found the land trend off to the N.E. Coasting to the eastward, and sounding, found it similar to the former, fine sand. A point bearing E. ½ S., hauled in for it; got the island to bear N.W., distance half a league. Soundings regular from 20 to 35 fathoms, good bottom, sand and gravel. Finding the weather favourable, we down boat, and succeeded in landing; found it barren, and covered with snow. Seals in abundance.

"The boat having returned, which, when secured, made sail off-shore for the ensuing night; in the morning altered the course so as to keep the land to the southward in view. Having doubled the point above mentioned, the land then took a south-easterly direction, varying to the eastward; weather thick and squally, with snow. I thought proper, having property on board, and perhaps deviating from the assurance, to haul off to the westward on intended voyage. Strong variable winds. Made another cape, and could perceive some high land to the westward of it, and stretching in a S.W. direction. The weather becoming thick and squally, we made sail to the westward, having sailed 150 miles to the W.S.W. The weather moderating, saw another headland bearing by observation E.N.E., distance 10 leagues; very high. Observed in lat. 62° 53′ S., by chronometer 63° 40′ West of Greenwich; named this Smith's Cape. Found the land to extend from the cape in a southerly direction. Shaped my course for Valparaiso, where I arrived on the 24th of November, after a passage of sixty days from Monte Video."

Additional information on these lands was subsequently communicated by Capt. Walker, of the ship *John*, of London. This vessel, in 1821, arrived from South Shetland in 98 days, with 12,000 seal skins, and afterwards returned for another cargo. The *John* was blown off in a gale of wind, and lost two anchors and a cable; the bottom being very rocky, other vessels have met with similar misfortune.

Capt. Cook's description of the Isle Georgia well applies to South Shetland. The country consists of numerous islands, without a vestige of vegetation. A species of moss only is found upon the rocks near the shore; eternal snows covering the more remote parts, which are mountainous. Nature in these regions assumes the most sterile and forbidding features; the thermometer was at no time below the freezing point, but the melting snows near the shore so completely saturated the soil as to check all vegetation. A species of coal was found in abundance, which burnt very well, thus affording the means, if wanted, of replenishing the fuel. The rise and fall of the tide is about 12 ft. Shrimps and penguins beyond all conception numerous. The islands, headlands, &c., have been named, and observations ascertaining the latitude and longitude repeatedly made. Part of an anchor stock, evidently Spanish, being bolted with copper, and bearing certain marks, was found on shore, and is presumed to be the only vestige remaining of a 74-gun ship of that nation, which sailed from Spain, bound to Lima, in 1819, and was not afterwards heard of.

Several United States' vessels have visited South Shetland; and an American account states that some of the harbours are very good, vessels in them being landlocked. Of the first three months of the year 1821, the mildest experienced there was March; but the seals had mostly retired to the water. A solitary spot or two of something like grass were the only marks of vegetation. No field ice was seen, but innumerable islands were floating about. The flesh of the young seals was often eaten, and was not disagreeable.

Capt. Dan. W. Clark, of the ship *Hersilia* (an American), reported that he penetrated to the 66th degree of latitude, where he observed lands stretching farther to the South, the extremities of which he could not ascertain. The whole, even in summer, was blocked up with snow and ice, except in particular places frequented by seals.

An early account of South Shetland stated that sperm whales were seen about the coasts, and it cannot be questioned that such whales may be occasionally here; but we have the authority of Capt. Laurence Frazier for stating that the whales hereabout are mostly fin-backs.

About twelve months after the first discovery of South Shetland, the British naval commander-in-chief on the South American station directed a further exploration, and for this purpose a hired brig, the *Slaney*, was sent, under the command of Mr. Edw. Bransfield. "We sailed," says the reporter, "from Valparaiso on the 20th of December, 1819, but did not arrive on cruising ground till the 16th of January, 1820, having been almost constantly harrassed with baffling winds and calms till we arrived in a high southern latitude. On that day, however, we had the good fortune to discover the land to the south-eastward, extending on both bows as far as the eye could reach. At a distance its limits could scarcely be distinguished from the light white clouds which floated on the tops of the mountains; upon a nearer approach, however, every object became distinct. The whole line of coast appeared high, bold, and rugged, rising abruptly from the sea in perpendicular snowy cliffs, except here and there where the naked face of a barren black rock showed itself amongst them. In the interior, the land, or rather the snow, sloped gradually and gently upward into high hills, which appeared to be situated some miles from the sea. No attempt was made to land here, as the weather became rather threatening, and a dense fog came on, which soon shut everything from our view at more than 100 yards distance. A boat had been sent away, in the meantime, to try for anchorage, but they found the coast completely surrounded by dangerous sunken rocks, and the bottom so foul, and the water so deep, that it was not thought prudent to go nearer the shore in the brig, especially as it was exposed to almost every wind. The boat brought off some seals and penguins, which had been shot among the rocks, but they reported them to be the only animated objects they had discovered. The latitude of this part of the coast was found to be 62° 26′ S., and its longitude 60° 54′ W.

On the 12th of February, 1832, Capt. Biscoe, in the *Tula*, was advancing from the westward, and in lat. 66° 27′, long. 81° 50′, many birds were seen—albatrosses, penguins, Cape pigeons, &c.,—with several hump and finned-back whales; and no fewer than 250 ice islands were counted from the deck. On the 15th land was seen, bearing E.S.E., but at a great distance. Lat. of the ship, 67° 1′, long. 71° 48′. On the following morning the land was ascertained to be an island, and called *Adelaide Island*, in honour of the Queen; and, in the course of the ensuing fortnight, it was further made out to be the westernmost of a chain of islands, extending E.N.E. and W.S.W., and fronting a high continuous land, which Capt. Biscoe believes to be of great extent. The range of isles has since been called *Biscoe's Range*.

The main land was named by Capt. Biscoe *Graham's Land*, but it is unquestionably the same which was marked in the old charts by the name of *Gherritz Land*, it having been discovered in 1599 by Dirk Gherritz, of the *Good News* yacht, one of the five Rotterdam ships which doubled Cape Horn, and which he reported to lie in 64° S.*

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* It is also the *Clarence Land* of Capt. Foster, 1829, who seems not to have been aware that this name had been given to a principal isle of the group to the north-eastward.

Adelaide Island is described as having a most beautiful appearance, with one high peak shooting up into the clouds, and occasionally appearing both above and below them, and a lower range of mountains extending about 4 miles from North to South, having only a thin covering of snow on their summits, but toward their base buried in a field of snow and ice of the most dazzling brightness, which slopes down to the water, and terminates in a cliff of 10 or 12 ft. high, riven and splintered in every direction, to the extent of 200 or 300 yards from its edge. At a distance of 3 miles no bottom could be found with 250 fathoms of line; and around all the islands the water was considerable. One island, in lat. 66° 20′, long. 66° 38′, has many bays, and forms, with the main land behind, a good harbour for shelter, but the bottom is rocky. No living animal was found on any of these isles, and not many birds, although only a few miles to the northward they were very numerous.

On the 21st of February, Capt. Biscoe succeeded in landing on the main land; the highest mountain in view he called *Mount William*, after His late Majesty. The place was in a deep bay, in which the water was so still, that could any seals have been found, the vessels could have been easily loaded, as they might have been laid alongside the rocks for the purpose. The depth of water was also considerable, no bottom being found with 20 fathoms of line almost close to the beach; and the sun was so warm that the snow was melted off all the rocks along the water line, which made it more extraordinary that they should be so utterly deserted. The latitude of Mount William appeared, from observation, to be 64° 45′, in long. 63° 51′.

Capt. Biscoe, after this, repaired to the South Shetland Islands, where he was driven ashore, lost his rudder, and very narrowly escaped shipwreck.

The northern point of what was considered as the main land by Captain Biscoe, was seen by him, at the distance of about 10 leagues, on the 27th of February, 1832; and the appearance of a range of islets, probably eminences on the main, continued in a north-westerly direction to the distance of 10 leagues farther, and not remote from a spot previously visited by the *Chanticleer* in 63° 26′ S., and 64° 6′ W., January 1829. To this point Capt. Foster imparted the name of *Cape Possession*, having here taken formal possession in the name of King George the Fourth. The coast from the cape takes a south-westerly direction, until lost to the eye on the horizon, where it appears to terminate in a mass of islands, of a bleak and dismal aspect, the same which were afterwards seen by Capt. Biscoe.

Early in the morning of the 5th of January, 1829, H.M.S. *Chanticleer*, from Staten Island, came in sight of *Smith's Island*, the westernmost isle of South Shetland. Fine weather of several preceding days was now succeeded by snow storms, which added not a little to the inhospitable appearance of the island. The vessel was also surrounded by icebergs; but with daylight and no night, she was enabled to thread her course among them. The island was covered with snow, excepting on the sides of the precipices and the faces of the rocks, where it could not lie; and these, from their black appearance, presented a striking contrast with the high snow-clad land.*

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* Captain Weddell, in his notice of South Shetland, states that he was the first person

On the 7th of January, after passing Smith's Island, the *Chanticleer* was coasting, with fine clear weather and a light easterly breeze, the coast called *Trinity Land*, to the southward of South Shetland. It appeared to be of considerable extent, with mountains of 6,000 or 7,000 ft. in height, and covered with eternal smow. The day was fine, and numerous whales (fin-backs) were spouting up columns of water, and blowing about in all directions; while flocks of variegated petrels, or pintadocs, were circling around, and sedulously watching these leviathans of the deep for the purpose of obtaining some sort of food or aliment from their slimy exuviæ; and penguins innumerable were popping up their heads here and there, skipping and starting out of the water in the full enjoyment of their gambols. From the deck of the *Chanticleer* eighty-four large icebergs were in sight.

The first chart of these islands, for the use of navigators, was constructed by the late Mr. George Powell, commander of the ship *Dove*, and published by Mr. Laurie, in 1822. In the composition of it, exclusive of his own observations and sketches, Mr. Powell was materially assisted by several intelligent commanders, both English and American, and he has added to the islands properly *South Shetland*, another group, considerably more to the East, which he discovered on the 6th of December, 1821. The latter lies between the parallels of 60½° and 60° 48′, and between the meridians of 44° and 47°. About it were innumerable icebergs and ice islands. These isles appear in the chart under the name of *Powell's Group*, or *South Orkney*, and to the principal isle Mr. Powell imparted the name of *Coronation Island;* but *Pomona*, or *Main Land*, was afterwards proposed by Mr. Weddell, as a more appropriate name.

Capt. Weddell has given an imperfect sketch of Powell's Group, under the name of *South Orkneys*. These islands he fell in with on the 12th of January, 1823; and he describes their coasts as, if possible, more terrific in appearance than those of South Shetland; the tops of the islands, for the most part, terminating in craggy, towering peaks, which look not unlike the mountain tops of a sunken land. The loftiest of these summits, towering up to a point, on a clear day, may be seen at the distance of 15 leagues.

By observations made on the 14th, it appeared that Saddle Isle, one of the easternmost islets of the group, lies in lat. 60° 37′ 50″, long. (by mean of three chronometers) 44° 52′ 45″. Mr. Powell placed this isle in 60° 36′ S., and 44° 32′ W., and this, we conjecture, is nearest to the truth.

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who landed upon Smith's, by him called James's, Island, the highest and most forbidding of all. The summit he estimated to be nearly 2,500 ft. above the level of the sea.

This island was seen, as above mentioned, by Captain Foster, in the *Chanticleer*, who named its summit (now known as *Mount Foster*) *Mount Beaufort*, in respect to Captain Beaufort, R.N., Hydrographer to the Admiralty, &c. This summit he states to be about 6,600 ft. above the level of the sea, its centre in lat. 63° 2′ S., long. 62° 47′ W., and to have been seen at the distance of 85 miles.

Capt. Foster adds, that the position of Mount Beaufort being tolerably well ascertained, may afford to those who, having met with adverse winds off Cape Horn, are compelled to pass its meridian to a high southern latitude, the means of ascertaining their longitude with tolerable precision, either by its bearing when on a known parallel, or by bearings from two stations sufficiently apart for that purpose, and connected by means of a self-registering log; and thus may be obtained the position of the ship.—*Webster*, Vol. II., p. 275.

Captain Powell's detail and general remarks accompany the chart abovementioned, under the title of "Notes on South Shetland," and to these notes is appended a Meteorological Journal of the Temperatures of the Air and Water on every day, from the 8th of November, 1821, to the 26th of February, 1822. To the notice of the climate, given on page 97, we now add the following:—

The best harbour is formed by *Deception Island* (lat. 62° 56′, long. 60° 32′), which island, or *shell* of an island, is certainly one of the most singular productions of nature; the land is high, and bold on every side, with a narrow opening, of about a cable's length, on its S.E. side, leading to a very capacious basin. The isle is a volcanic production; its shores on either side are bold; and pumice stone, with other substances, indicate its origin. There are also several hot springs, some of which are of a temperature sufficient to boil an egg. The basin is 5 or 6 miles across. At its mouth you will have 3, 4, and 7 fathoms of water, and increase very rapidly as you enter; from 7 fathoms you increase to 10, then 18, 27, 32, and then, a little within this, you will get no bottom at 60 fathoms. On the N.W. side of the basin there is a very fine cove, capable of containing several vessels, in about 4 or 5 fathoms of water, and a bottom of good clay. From the entrance of the basin up to the cove the course is N.W. by W.

Deception Island was one of the pendulum stations of the late Captain Foster, and a copious description of it is given by Mr. Webster, in his Vol. I., pp. 144—165; and by Captain Foster, in Vol. II., pp. 277—280. Its situation, as shown in the Table of Positions, is lat. 62° 56′, long. 60° 32′; and from the latter the longitudes of the other islands have been inferred.

"Among ice islands in a boisterous sea, attended with fogs, rain, and gales of wind, the little *Chanticleer* had no easy task to get to South Shetland. On the 10th of January, 1829, the Island of Deception was discovered, and a safe anchorage in the *interior* of it was shortly found. This island is justly entitled to its appellation, and is one of the most extraordinary productions of nature. Its formation is entirely volcanic, the principal part being composed of lava, ashes, and ice. The shores rise to an elevation of some hundred feet, particularly on the North side, which is considerably higher than the South; and being circular, of about 7 miles in diameter, it appears from a distance to be one large mass from shore to shore. In searching for a harbour to receive the *Chanticleer*, an opening was discovered, about 200 ft. wide, on its S.E. side; and on further examination, it was soon found that a large circular basin, of about 5 miles in diameter, occupied nearly the whole *interior* of the island, the external shores forming a perfect barrier or wall, thereby affording the utmost security within. The depth in the centre of this basin was 97 fathoms, rather too much for anchorage, but a small cove on its eastern side gave ample security to the *Chanticleer*.

"The pendulum was employed here, and the necessary observations performed, whilst the officers of the *Chanticleer* surveyed and explored this extraordinary island. Several small coves were found on the borders of the basin: and some stones placed on each other, in a rude clumsy manner, near one of them, were discovered to have been used by the crew of sealers for the purpose of boiling their oil. Nor were these the only traces of the sealing vessels;

for, in the exploring expeditions which were constantly going forward, another pile of stones, on a neighbouring eminence, was found, on examination, to contain the body of a man. He had evidently been a sailor belonging to one of these vessels, but of what country could not be discovered. There was nothing found near him to indicate how he had died, nor at what date. The stones were carefully replaced and a notice left on the spot, that his remains might not again be disturbed.

"The external as well as the internal shores of this island, from the friable nature of its materials, present some very remarkable appearances. The eastern side is entirely faced with cliffs of ice, about 300 ft. in height, which the constant washing of the sea forms into singularly fantastic shapes. Similar cliffs are also found on the South and S.W. sides, and their base is bounded with a beach of ashes and lava, which extends round the whole island at low water. The examination of the basin was attended with considerable difficulty, arising from the small ashes and dust which were carried into it from the island. Seals and their companions, penguins and sea-leopards, were the only inhabitants found in this desolate island, which affords not the slightest verdure. Streams of water at a temperature of 140° and 160° Fahrenheit, were found issuing in some places from the sides of the hills, and running into the basin, the water of which was scarcely above the freezing point. It is generally supposed that this basin was formerly the crater of a volcano, and that the sea has found its way into it by washing out the narrow passage by which the *Chanticleer* entered. How long it has been resorted to by sealing vessels is unknown."

BRIDGMAN ISLAND.—Near the centre of the Shetland group is *Bridgman Isle*, in lat. 62° 10', long. 56° 40', apparently another volcanic production. Captain Weddell, on passing within 200 yards of it, observed smoke issuing through the fissures of the rock, and apparently with much force. The figure of the rock is nearly round. It is very small, but 400 ft. in height, partaking of the form of a sugarloaf.

26. LOUIS PHILIPPE LAND, JOINVILLE LAND, &c.

To the southward of the South Shetland group, is the land discovered by the late Admiral D'Urville, of the French Marine, and named by him as above. From a letter, addressed by him to the French minister, contained in the *Bulletin de la Société de Géographie de Paris*, 1838, p. 275, we copy the following notice of his exploration :—

"On the 27th of February, 1838, after a long stretch toward the South, through much ice, we came upon these mysterious lands; and, in spite of the complicated obstacles against which we had to contend, both on account of the continued bad weather, and from the fog and ice, in the space of about eight days we succeeded in tracing exactly their outline, for a distance of about 120 miles, between 63° and 64° S. lat. The land, which is crowned with immense peaks (Mount D'Urville is 3,060 ft. high), is covered by continual snows, of unknown depth. Were it not for the blackish rocks, rendered visible by the melting of the snows which form their limits on the coast, one would often be scarcely able to distinguish them from the numerous fields of ice which surround them. The principal of these places has received the name of Louis Philippe Land, in honour of their king, who first conceived the idea of making these explorations towards the South Pole. Other islands have received the names of various persons who have exhibited an active interest in our expedition, more especially of that illustrious statesman who arranged the plan of our voyage. Lastly, the mountains, capes, and islands will recall the memory of the officers who took part in our dangers."

These distant and desolate regions were also visited and examined by the Antarctic expedition under Sir James Ross in December 27, 1842—January 30, 1843.

During this exploration many additional features, islands, capes, inlets, &c., were discovered and named. The chief of these are the Danger Inlets to the westward of Joinville Land; an extensive gulf, named Erebus and Terror Gulf, the appearance of which led to a supposition that there was a passage through between Joinville and Louis Philippe Land into Bransfield Strait; an inlet called Admiralty Inlet to the southward of Louis Philippe Land, which was found to extend nearly a degree farther South than D'Urville explored. Many most interesting particulars are given in the account of Sir James Ross's Expedition, Vol. II., Chap. 12. Great numbers of black whales of the largest size were seen, and the whole of the land appeared to be volcanic.

POLAR ICES.—The barrier of ice which surrounds the Antarctic Pole appears to be variable in its extent and locality. We have before noticed the great quantity of ice which had drifted northward, towards the Cape of Good Hope, during the year 1840, or at the period that Captain Sir James Clark Ross and his companions were so successfully pursuing their discoveries on the opposite side of, and in close proximity to, the South Pole. It may have been owing to some great disruption of the barrier, that allowed Captains Ross and Crozier to penetrate so near to the Pole; and a similar occurrence may have taken place at the time that our enterprising countryman, Captain Weddell, proceeded to higher southern latitudes than any previous navigator; he having attained to 74° 15′ S., in long. 33½° W., between the meridians of the Sandwich Lands and the South Orkneys: this was in January, 1823. In February, (1838,) when Captain Weddell found the sea clear of ice at the commencement of his bearing to the southward, Admiral D'Urville was prevented from proceeding southward by a compact and impenetrable barrier of ice. In the volume above mentioned, page 121, is a further communication from him, relative to this part of the voyage:—

"Having escaped from our prison, we continued along very close to the barrier for about 300 miles, without finding any opening. This time it was uniformly West and East, without the slightest appearance of a passage. On the 15th of February, 1838, having come to long. 30° 40′ W., and having traversed all the parts by which Weddell says that he penetrated without having seen a single field of ice, and finding the barrier taking a northerly direction towards the Sandwich Lands, I judged that it was time to quit this tedious search. The crews were much fatigued; the nights already long, redoubled the danger of this adventurous navigation, and I could no longer continue it without a sort of blind imprudence.

"Hence we steered to the West; we made successively the South Orkneys;

then the eastern part of South Shetland, where we rectified some grave errors; then we picked our way afresh to the southward; thence, between 63° and 64° S. lat., for the space of nearly 180 miles, we explored the lands before mentioned, until then completely unknown; which we did without any accident.

"At last we cleared entirely Bransfield Strait, which no ship of war had ever before traversed; and on the 7th of March we quitted definitively the southern lands, and with them the ices. For fifty-two days we had not been a day without being surrounded with them, and we frequently counted from 60 to 80 bergs, and upwards, around us, independent of those which often barriered our route.

"This navigation was very fatiguing for all the members of the expedition; and although this was the first attempt that had been made by the French, I have the firm conviction that no commander of an expedition could have pushed his researches further than I have done, under the same circumstances."

21. MEDEIROS ROCK (?).

A rock, just awash, in lat. 25° 41′ S., long. 44° 47′ W., or 132 miles S.W. by S. of the entrance to Rio Janeiro, was seen by a pilot of Bahia, named Medeiros, in February, 1811. The position here given is uncertain.

Capt. J. G. Toms, of the *Salus*, reports that on December 5th, 1880, he passed about 30 yards to windward of a rock, which he supposed to be the reported Medeiros Rock. He says: "It appeared about fifty yards in extent in an E.N.E. and W.S.W. direction, and 6 or 8 ft. of water on it, the bottom perfectly distinguishable, of a light grey colour; it appeared in the form of the letter S elongated, and 10 to 15 yards across in the centre. Our latitude at the time was 25° 26′ S., long. 44° 21′ W." His crew being sick, it could not be examined more fully. No bottom was found at 110 fathoms, 330 yards from it.

22. LAUREL SHOAL, OFF THE RIO DE LA PLATA.

The *Laurel*, M'Donald, from London to Valparaiso, put into the River La Plata on the 19th of June, 1822, having been obliged to bear up to repair some damage sustained by a heavy sea breaking on board her.

The master reports as follows:—That, on the 15th of June, he discovered a shoal in lat. 36° 28′ S., long. 51° 30′ W.; that it appeared to be about a mile long, and the same in breadth, with a sea breaking very high over it; that it had the appearance of sand, and little water on it. He passed within half a mile, and then hove-to, sounding with 20 fathoms of line, and no bottom. He further states that he had a good chronometer on board, and was 6 miles (which way?) out of his longitude when he made the port of Monte Video.—*Newspaper*.

23. ISLANDS OF ALEXANDER I. AND PETER I.

Islands of Alexander I. and Peter I.—The first in 68° 57′ S. and 73° W., the other in 68° 0′ S. and 91° W., were discovered by the Russian Captain Bellinghausen, in 1821. Two frigates, under this commander, it appears, were employed on a voyage of exploration, and penetrated to the 69th degree of South latitude, but were unable to proceed further, The particulars of their voyage have been published in the Russian language, but no translation of it has been made.

24. REPORTED ISLANDS AND SHOALS.

As with other regions, so the South Atlantic has been fertile in the announcement of shoals, islands, and dangers, which have neither been properly authenticated by the simple but inexorable argument of the sounding lead, or by a close examination of the rocks or islands so confidently announced.

In very many instances, as will be seen, these reports rest on the most vague surmises; in others there is a stronger appearance of credibility; yet there are some circumstances connected with them which either totally disproves their existence, or casts such a strong doubt, that it is only necessary here to name them.

In this enumeration an alphabetical arrangement is followed. In some few cases there is a bare possibility of an erroneous reckoning having misplaced a shoal or rock, and thus it has eluded the various searches made for them; but this is probably rare.

L'Aigle Shoal.

A shoal bearing this name is said to have been seen on the 1st of October, 1817, by Mr. R. Poole, of the ship *L'Aigle*, who places it in lat. 51° 51′, long. 64° 30′. It was described as extending North and South, 200 or 300 yards. The ship was then steering S.E., and about three-quarters of a mile from it off and on. Steering South, about 1½ mile, had soundings in 87 fathoms.

In the *Liverpool Mercury*, 12th of Nov., 1824, was a notice from an officer of the frigate *United States*, stating that a rock had been discovered between the Falkland Islands and Patagonia, in lat. 51° 51′, long. 64° 42′.

The position of this shoal, said to be between the Falkland Islands and Patagonia, has been so frequently sailed over, that it cannot exist. It may have been a current rip.

Antonio Viana Bank.

The only notice that we possess of the shoal bearing this name is the following, from the old Sailing Directions for the Coast of Africa. "Between the seventeenth and eighteenth degrees of latitude, 70 or 80 leagues W.S.W. from Cape Negro (according to Pimentel), are the shoals and breakers of *Antonio Casado de Viana*. These are very dangerous to ships coming from Brasil to Benguela and Angola—one of the rocks only appearing above water. The shoal is very steep, and cannot be discerned in the daytime till you are near, on account of the prodigious foaming of the sea, whose roaring, being heard at a great distance, may, during the night, give you notice of the danger." (Never since seen or reported.)

Ariel Rocks.

These rocks were stated to have been discovered by the schooner *Ariel*, on her passage from Liverpool to Valparaiso, Dec. 22nd, 1827. "Saw something of a reddish appearance above water, about a quarter of a mile distant; hauled into it, immediately took in all the studding sails, and sounded ground, 47 fathoms, fine sand. The object seen was about 6 ft. above water, but larger underneath. When close in, saw another head about a cable's length to the N.E. of the first, 2 or 3 ft. below the surface of the water, also of a reddish appearance. The sea was breaking over both, and making a noise. There was some seaweed about them, and an immense number of sea birds. The correct position I give as lat. 40° 0′ S., long. 57° 37′ W." —*Thomas Dixon, Master*.

From the nearest land these rocks are, therefore, about 200 miles distant; and they would lie in the direct route of vessels bound to the southward from the Rio Plata.

Captain P. P. King sought for these rocks, but without success. He says:—"On June 21st, 1830, we sailed with a fresh breeze from the S.W.; and at 9 a.m. on the 25th, when about 1 mile southward of the alleged position of the Ariel Rocks, and near their nominal longitude, I hauled to the wind, and ran some distance on their parallel, looking out for broken water. There was a very regular and heavy swell, as much as would be raised by a gale of wind, but caused, apparently, by a current. A heavy swell rose on the quarter, which struck our weather quarter boat. For a moment I thought we had indeed found the rocks; and the huge black back of a dead whale, which just then showed itself very near the vessel, much increased the sensation. I imagined that we were in a meeting of tides and currents, where old trees, dead whales, &c., are often found.

Capt. FitzRoy also says, "In the first volume some notice was taken of the supposed Ariel Rocks, and I will avail myself of this opportunity to say, that at various times the *Beagle* passed over and near their asserted position; and that she likewise searched for the reported Aigle shoal or rock, without ever finding the slightest indication of either."

There is an announcement in the Nautical Magazine, 1845, p. 47. It states that Mr. Tinnon, of the brig *Middleton*, of Maryport, on March 7th, 1844, when on his passage from Buenos Ayres to Valparaiso, discovered rocks in lat. 42° 22′ S., long. 55° 13′, per chronometer (five days out), on which broken water was seen for a quarter of a mile North and South. The ship was about a quarter of a mile from them when discovered. Supposed them to be the Ariel Rocks, though there is a considerable difference in the position. This is all that is stated, but no soundings or verification given, a most reprehensible omission. It seems most probable that they do not exist.

Ascençao or Portuguese Ascension.

An island formerly stated to be 300 miles westward of Trinidad, long since exploded.

Aurora Isles.

Several small isles, distinguished by this name, found a place in the charts from the reports of the Spanish navigators, and Capt. Weddell gave some copious extracts from those reports. They were said to have been first seen in 1762 by the ship *Aurora*, after which they were named; and again, in 1790, by the ship *Princessa*. The corvette *Atrevida*, in 1794, went purposely to *situate* them; and they were then described as three, very nearly in the same meridian; the central one rather low, and the other two so high as to be seen 9 leagues off. *Positions*:—northern isle, 52° 37′ 24″ S., 47° 43½′ W.; middle isle, 53° 2′ 40″ S., 47° 55½′ W.; southern isle, 53° 15′ 22″ S., 47° 57½′ W. The description annexed was very circumstantial, and there seemed to be no reason for doubting their existence, however questionable the position might have been.

The islands have been sought for by Capt. Weddell, Capt. Briscoe, Capt. Johnson, and others, but without success; and of their non-existence there seems no longer to be any doubt.

Blaesdale Reef.

On the 15th of October, 1819, the brig *Richard*, of Ulverston, Captain Blaesdale, is said to have struck on a coral reef, in about 0° 56′ or 0° 57′ North of the Equator, and longitude, by account, beyond 41° W. The following is an abstract of the *Richard's* log:—"Friday, 15th of October, 1819, fine moderate weather; ship going three knots; at 6 p.m. grounded; did not remain fast above ten minutes. Water smooth; saw no breakers. In a few minutes after sounded, but got no bottom with 125 fathoms of line. Latitude at noon, by good observation, 0° 57′ N. Run West until 6 p.m. Longitude 41° 22′ W. The vessel drew 11 feet of water; in one hour there were 18 inches of water in the well. When the ship arrived at Para, whither she was bound, three holes were found, each about the size of a man's hat, and nearly through her bottom, and several large pieces of white coral were sticking in different parts."

This account would seem to be circumstantial, but the U.S. ship *Dolphin*, in her important mission, had a good sounding of 2,980 fathoms in its position, besides two others with no bottom at 1,000 and 2,000 fathoms in its vicinity. This decides the question.

Geerken Shoals.

Two spots of very discoloured water (sunken reefs ?), which was slightly breaking on these places, about 4 fathoms deep. No observations could be taken at the time, as the weather was thick and rainy. The positions of these spots were lat. 42° 14′ S., long. 54° 38′ W.; and lat. 42° 16′, long. 54° 42′ W.

The fact of no soundings having been taken invalidates this statement, which must be taken for what it is worth.

Grant Breakers.

Said to have been seen by Captain Grant, 1800 or 1801, in about lat. 31° 33′ S., long. 11° 30′ W. They were high and dangerous, and were supposed to be the same seen by Captain Smith, in the ship *Comte de Molke*, in 1760, in lat. 31° 0′ S., long. 21° 45′ W., or 10° to the westward. This is too vague for credence.

Heard Shoal.

Captain Luther Heard, of the ship *Charger*, from Calcutta to Boston, on January 31st, 1859, at 4^h 20^m p.m., met with discoloured water. The shoal appeared to be of clear sand, stretching N.W. by W. and S.E. by E., about half a mile, and one-third of a mile in width, and as near as could be judged by the appearance of the bottom, there was 10 or 12 ft. water on it. It lies in the track of homeward bound ships round the Cape, and is therefore dangerous, lat. 34° 56′ S., long. 17° 40′ E. *No soundings taken.*

Isla Grande.

An island was laid down on the old charts, in lat. 45° 30′, long. 46° 40′. The following is the notice of it:—

"In the latitude of 45° S. there is a very large pleasant island, discovered by

Antony La Roche, a native of England, in his passage from the South Seas, in the year 1675. The Spanish author, who gives the abstract of La Roche's voyage, printed, according to him, in 1678, says, that La Roche leaving the land (discovered by him in 55° S., and which was seen by the *Leon*, in 1756), and sailing one whole day to N.W., the wind came so violently at South, that he stood North for three days more, till they were arrived in 46° S.; when, thinking themselves then secure, they relate that, directing their course for the Bay of All Saints, in Brasil, they found in 45° S. a very large pleasant island, with a good port toward the eastern part, in which they found wood, water, and fish; they saw no people, notwithstanding they stayed there six days. The size of this island is not mentioned in the Spanish abstract; but the expression *muy grande*, very large, and the expectation of finding inhabitants, seem to indicate that it is of great extent."

It was frequently sought for by the older voyagers, who, finding indications of land, such as driftwood, discoloured water, &c., believed in its existence. But it has long since been disproved. In our earlier editions the discussion will be found. It is useless now.

Kattendyk's Droogte.

This so-called "dry bank" was placed in about 33° S., long. 4° 55′ E., on Dutch authority. Sir James Ross passed over its position, and found no bottom with 120 fathoms. Farther East no bottom with 580 fathoms.

Lennon's Reef.

Mr. John Lennon, commander of the ship *Hibernia*, said, "On the 9th of April, 1817, on my passage to India, I touched at the Island of Tristan da Cunha; and at 8 a.m. of the above date sailed again. When clear of the island, steered E. by S. with a fair wind, until 11ʰ 20ᵐ a.m. of the 12th, then in lat. 37° 31′ S., long. 4° 42′ W. Ship going at the rate of 7 knots per hour, perceived a sunken rock close on the port bow; bore up immediately, and with great difficulty escaped running on it. The part or end that at one time was close alongside, I could very distinctly perceive. The rock was about 9 ft. under water; and, at the distance of about 100 yards, I suppose the rock was nigher the surface. *There appeared to be fields of weed growing from the rock.* On taking a good look-out all round, we could perceive two other rocks or shoals at no great distance from each other. Bearings from Tristan da Cunha, by compass, E. by S., distant, by log, 357 miles."

This was probably driftwood, which is frequently encountered on this parallel.

Montezuma Rock.

According to the Cape of Good Hope Shipping List of July 14th, 1843, Captain A. M. Shiverick, of the American whaler *Montezuma*, discovered, on March 23rd, 1843, a rock lying in lat. 29° 32′ S., long. 39° 30′ W. This is all the information given respecting this danger.

Moore Bank.

Captain Moore, of the *Russell Ellice*, from Swansea, at the Falkland Islands, found soundings in 45 fathoms water, on a supposed bank, in lat. 30° 50′ S., long. 35° 50′ W. The attention was directed to it by the change in the colour of the water.

This is 45 miles S.W. from the soundings, by Captain Denham, said to be of the depth of 7,700 fathoms. It was sought for, without success, by the *Herald*.

Robson Reef.

Barque *Anne*, of Liverpool, Captain W. W. Robson, toward the Isle of France, 1829.—On Monday, the 12th of October, made Tristan da Cunha. On Sunday, the

18th, at 9h 30m a.m., saw on the lee bow what Captain Robson at first supposed to be whales, but, when about 50 yards from them, observed they were rocks about 8 ft. above the water, the sea breaking heavily on them. They were something of a horse-shoe shape. There was a good deal of long tangle growing on them.

The latitude of the reef is 37° 35′ S., long. 7° 31′ E.

Captain Liddell, of the ship *Wellington*, December, 1835, questions its existence, and he says, "I confess I was exceedingly surprised when this account first met my eye, as, on reference to my journals, I found I had passed twice nearly over the very spot in the day time. But, when it is considered that this 'crescent rock' is situated not only in the direct route of all the outward bound vessels to the eastward, but also in the very cruising parallel of the American whalers, whose number yearly frequenting that part of the ocean exceeds *three hundred*, may we not be permitted to suspect 'that dead whales, shoals of devil fish, and other huge marine monsters,' are still sometimes mistaken for banks and rocks?"

Sandré Rock.

A more than doubtful danger to the southward of the Penedo de S. Pedro, said to have been seen December 30th, 1849. The particulars are given on page 222, *ante*.

Saxemberg Island.

An island, named Saxemburg, is said to have been first seen by J. Lindeman, of Monnikendam, 23rd of August, 1670. He represents it as having a remarkable narrow peak, like a column, near the middle of the island; and, from his account, it was laid down in the charts at about 30° 45′ S., and 19½° W. Captain Galloway, in the American ship *Fanny*, outward bound to China, in 1804, supposed that he saw it *at a great distance*. He states that it was four hours in sight, from the mast-head, without changing its appearance, which exhibited a peaked hill in the centre, and a bluff at one of the extremities, situated in the parallel above mentioned, but *two degrees more to the eastward.*

It was again supposed to have been seen by Captain J. O. Head, in the ship *True Briton*, on a voyage to Calcutta, 9th March, 1816.

The account of an island, said to have been seen by the *Columbus*, Long, master, in 1809, lat. 30° 18′ S., long. 28° 20′, is now given up as unfounded. These are of the most vague character.

Télémaque Rock.

A rock, said to have been seen January, 1786, in lat. 38° 11′ S., long. 21° 56′ E., South of the Cape of Good Hope, but this has long been considered to have been an iceberg.

SECTION IV.

THE NORTHERN COAST OF BRASIL, FROM CAPE SAN ROQUE TO MARANHAM AND PARA'.

THE coast line of the Empire of Brasil extends from lat. 4½° N. to 34° S., with a total length of upwards of 3,700 miles. It contains numerous harbours and places of refuge, which are rapidly increasing in importance, as railways and other means of communication are being constructed to bring the riches of the interior country to the coast. The area of Brasil amounts to about 3,288,000 square miles, with a population of about 10,000,000. The exports consist solely of the raw produce of the soil, such as sugar, coffee, india-rubber, &c.

"During my long residence in Brasil, I have observed that the agricultural wealth distributed amongst its provinces, with rare exceptions, is derived from a very narrow circle extending inland from the sea coast some 30 or 40 leagues, and that the wealth of its vast interior in minerals and important vegetable products is mostly intact, notably in the province of Bahia, which has been deprived of commerce from the want of roads and bridges with which to facilitate their exploration and export. What has hitherto been done in the shape of railroads is as nothing compared to the vastness of the country, and to the large populations located in the interior, where the fertility of the soil furnishes food for ten times its present population, but where crops rot on the ground for the want of means of transport."—*Mr. Consul Morgan*, 1875.

The NORTH COAST of BRASIL was cursorily surveyed by the Baron Roussin, who, however, well determined the geographical positions of the points. The banks off the coast, however, were not minutely examined, and in consequence, the extensive banks which lie at from 6 to 8 miles off the N.E. Coast of Brasil were very imperfectly represented. This important defect was remedied in a great degree by the more accurate survey made by Lieutenant M. A. Vital de Oliveira, of the Imperial Brasilian navy, in 1857—9; but the more minute survey of the off-shore banks, made by Capt. Ernest Mouchez, of the French navy, published in 1869, showed that the Brasilian survey was very loose and defective. The ensuing directions are therefore in part from Capt. Mouchez' instructions, and adapted to his charts.

All the coast described in this chapter, with the exception of the Province of Ceara, is very low, formed of sand-downs of very monotonous aspect, and but slightly interrupted here and there with low reddish cliffs. In general the coast is visible 15 or 20 miles off. There is no harbour or shelter, and the entrances to the rivers, generally turned toward the N.E., are blocked up with sand-bars, with the exception of the Tutoia. These rivers have all the same general appearance: the East sides are composed of sand-hills, and the West sides are covered with vegetation and mangroves. The sand is all travelling, or being blown to leeward, and the summits of the hills are frequently hidden by a cloud of sand driven horizontally to westward. The sand-downs, too, are higher as you advance westward.

The country within this sandy coast is nearly all desert, and uninhabited, except by some wretched villages of fishermen. But between Cape San Roque and Ceara there are some headlands, formed by cliffs, and hills rising to 300 or 400 ft., which make the landfall rather more certain.

CAPE SAN ROQUE is a headland, in lat. 5° 29′ 15″ S., and 35° 15′ 18″ W., 23½ miles to the S.S.E. of *Point Calcanhar*, the N.E. point of Brasil. The cape, *so called*, is merely a down of sand, like the coast which precedes it to the South, and follows it to the North. The sand is uniformly white, and over it are several clusters of bushes. It may be known by several small *red cliffs;* but these only show when the sun is in a favourable direction; there may, however, be seen, a little to the South, several large trees near the coast, and their wholly disappearing may form a guide for proceeding northward. The appearance of the land to the South of the cape is much more uneven than that to the North. The highest land close within the cape is 180 ft. high, and visible 15 miles off in clear weather.

When making the land to the southward of Cape San Roque, the isolated mountain of the Rio Grande, named the *Morro Pinto*, forms a good mark; it is in the form of a flattened cone, and visible 24 miles.

Point Pititinga.—Northward of Cape San Roque the coast gradually falls in height, to the distance of 7 miles, where it forms the low point *Pititinga*, or *Morro Santa Cruz*, a mass of bare sand downs, on the summit of which is a large bushy and isolated tree, one of the best marks on the coast. Here the shore on the North forms a low bay, in which good anchorage will be found 1½ mile N.W. by N. of the extremity of the point in 16 or 20 ft. of water, taking care to avoid the patches of rocky ground. The village lies on the South side of the bay. The coast between San Roque and Point Pititinga is wholly of sand downs, on which may be discovered bushes of a dark green colour, cocoa-nut trees, and small villages; and there are, here and there, some large trees, in round masses, but not definable as marks on approaching the shore. The extremity of Point Pititinga is in lat. 5° 22′ 30″ S., long. 35° 19′ 15″ W.

Point Pititinga has reefs extending off it to the northward. The best place for landing in all the channel is in the bay under shelter of these reefs, and to the eastward of the village. At 11½ miles beyond Point Pititinga is *Point Gamelleira*, between them being situated the small rivers *Guaxinim* and *Punahu*, and the villages of Fogo and Garças, sheltered, as are all the villages on this coast, by cocoa-nut trees.

Point Gamelleira is formed of sand downs, and had some *dead* trees on it, forming a good mark. From Gamelleira Point the coast runs to N.W. ½ N. 5 miles to Calcanhar Point. Halfway is the village of Touro, consisting of a hundred houses, which is the most important place on the shores of the San Roque Channel. The position of this place may be known by two remarkable patches of black cliffs, lying just to the southward of it. Landing is not easy with a high sea. Point Gamelleira would be a good site for a lighthouse.

POINT CALCANHAR, or Toiro, the summit of which is in lat. 5° 9′ 30″ S., long. 35° 29′ 15″ W., is situate at the distance of 16½ miles N.W. by N. ¾ N. from Point Pititinga, and the coast continues of the same nature with that which has been described, being low and sandy. Point Calcanhar is a low rounded point, not recognisable from a distance. In passing through the channel, vessels must not approach this point within a mile, on account of a dangerous rock which lies off it half a mile to the eastward.

From Cape San Roque to Point Calcanhar the shore is bordered by the *Recife*, or that remarkable ridge of coral rock, which characterises the coast in general, as shown in the charts. The more elevated part of this reef, within the present extent, is called *Pedras de Fogo*, about 8 miles to the northward of Point Pititinga, and near which there is good anchorage.

A few fresh provisions and water may be procured at the small villages at Pititinga, Fogo, Garças, or Touro, but there are no vegetables. They must be bought by barter, as money is useless. These supplies have become more abundant of late years, since the extreme western crossing of the Equator has been advocated, which has led to many wrecks, and brought vessels into difficulty more frequently than formerly.

The Recife, the belt or coral chain of rock, more particularly distinguishes the eastern coast, but it may also be traced on the northern, nearly all the way to Maranham; and M. Roussin says that it seems as if its object were to defend the shore from the impetuosity of the waves, by which it is constantly assailed.

The reef, in several instances, is so exactly straight and even, as to seem the work of art, and rising like a wall from the bottom of the sea. In some places it is always covered; in others it is level with the sea at high water, and particular spots are from 6 to 10 ft. above it. Its cuts or openings form the entrances to most of the creeks or harbours, as will be shown hereafter.

BANKS of SAN ROQUE.—The Banks of San Roque are on a great extent of shoal ground which encompasses all the N.E. coast of Brasil. Commencing at Cape San Roque in the South, they terminate beyond Point Tubarao, in the N.W., in an extent of about 90 miles. The reefs lying off the N.E. coast of Brasil may be divided into two principal groups, those lying between Cape San Roque and Calcanhar Point, and those between the villages of Cotia and Caicara on the North coast. The first group, inside of which is the San Roque Channel, does not extend more than 4½ or 5 miles from the coast in any part.

These reefs being now well known, by the careful surveys of Capt. Mouchez, are no longer a danger to navigation, but in certain cases become very useful by offering on this unsheltered coast a safe and quiet anchorage to ships windbound, or disabled by accidents; the more urgent repairs may also be made here, to enable them to reach their destination.

The first group of the rocks is formed of masses of coral, lying on rocky shoals 16 or 18 ft. under the water. At low water many of these coral patches rise above the surface of the sea. The outer boundary of the reefs is steep-to, and has 4 or 5 fathoms of water close-to. When the wind is not too fresh they can easily be crossed in a boat, by channels having a depth of from 7 to 14 ft. between the rocks.

During the season of the southerly winds (June, July, and August), the breeze is fresh and the sea very rough around Cape San Roque; but during all the rest of the year, and especially when the wind is between E.S.E. and N.E., the sea is very smooth over the reefs between San Roque and Calcanhar, whilst it is always rougher near the second group of reefs, situated more to the N.W. towards Caicara; this, without doubt, is owing to the fact that, in front of the first group, the sea gradually diminishes in depth in coming from the sea; whilst, close in front of the second group, the bottom is lost in very deep soundings. Lieut. Lee found a depth of 2,710 fathoms at 30 miles from the reefs.

Between San Roque and Calcanhar, when it is high water, and the wind moderate, it often happens that no breakers are seen on the rocks. It is seldom that wrecks of vessels are not seen; there were four at the time of the survey of Capt. Mouchez.

The San Roque Banks extend parallel to the coast, at a distance of 4 or 4½ miles from land, and are divided into three reefs, with broad channels between them. The most southerly one is that of *Maracajahu*, or *Pititinga*, its South end being 3½ miles N.E. by N. ½ N. from Cape San Roque; it is nearly 5 miles long N. by W. and S. by E., and 1¼ to 2¼ miles in breadth.

Fogo Reef, separated from the foregoing by a distance of 6 miles, called the Pititinga Channel, is 6 miles long, and from 1 to 2 miles broad; it is separated from the village of Garças by a channel of 3 to 3¼ fathoms, in which there is anchorage. Southward of Fogo Reef are several shoals, with 2 to 3 fathoms on them, on the northern side of the Pititinga Channel.

Sioba Reef, situated 3 miles to the East of Point Calcanhar, is the smallest of the three: it is only 2¾ miles long N.W. by W. and S.E. by E., and half a mile broad. At 1 mile S.E. by E. of it is *Cacao Reef*, with a depth of 12 ft. on it.

Between Sioba and Fogo Reefs there is a channel called the *Dos Touros Channel*, 3½ miles broad, but it is encumbered by three or four small isolated banks, on which there is only 2½ or 3 fathoms of water.

A large bank, 10 miles long, and from 1 to 2 miles broad, of 2¾ to 5 fathoms, extends from the N.W. to the S.E. outside Sioba Reef and the North point of Fogo Reef; the middle of this bank is precisely opposite the channel between these two reefs. The bottom is gravel, coral, and broken shells.

The SAN ROQUE CHANNEL runs parallel with the coast within the banks above mentioned. The coast itself is fringed by reefs and banks, which vary in their distance and extent; it is 25 miles long, and from 1 to 2 miles broad. The usual depth is from 19 to 22 ft., the bottom consisting of gravel or broken shells. The least depth at low water is 16 feet; anchor can be cast anywhere, avoiding the numerous smooth rocky parts which are met with. Anchoring should be preferred in the places most sheltered from the swell by the reefs, such as Pititinga, Fogo, and Gamelleira.

Coasting vessels and the Brasilian packet boats are continually frequenting this channel; the pilots know the navigation of it perfectly, which is by no means difficult.

The tides are pretty regular, but not strong. The flood tide inclining to the South, and the ebb to the North, as it does on all this coast.

From South to North.—To enter the channel from the South, Cape San Roque must be brought to bear S.W. by W., and the tree of Pititinga Point

N.W. by N. From this position steer N. by W. ¾ W., until the centre of the village of Fogo bears West; from thence the course is N.W. by N. ½ N. To cross the narrowest part of the channel abreast of Pititinga, you must steer so as not to completely hide Point Maxaranguapé by Cape San Roque, the line of these two points passing to the East of the *Thereza Pança Bank*, situated before the village of Maracajahu.

The N.E. part of Thereza Pança Bank is still well pointed out by the line of the cocoa-nut trees of Guaxinim in line with Point Pititinga; the cocoa-nut trees must not be hidden by the point.

A bank of 9 to 18 ft. is situated in front of Fogo and the Barreiras do Inferno, well marked by its red cliffs. This is the narrowest and most shallow part of the channel (formerly called the bar); as soon as you have got above it, you must go parallel with the coast at a distance of 1 to 2 miles; you will thus pass in mid-channel, between Point Calcanhar and Sioba Reef.

From North to South.—Having made out Cape Calcanhar from the North or N.N.W. by the aid of the mark of the Morro Branco Mountain, then, on approaching it, the little knoll of cocoa-nut trees of Quixaba will soon be seen; also the church and the two small black capes Dos Touros. As soon as these points are seen, you must get them in line with Point Matto Caboclo, and, steering S.E. at 2 miles from land, follow the route pointed out above, with the aid of the same marks.

Pititinga Channel, which is 2¾ miles wide between the shoals, permits entry into the channel or exit from it, if it be not needful to follow it to the end. In steering N.E. from the Arbre de Pititinga, or N.E. by E. from the village, this channel will be crossed in depths of at least 19 or 22 ft., and you will soon find yourself in the open sea.

Dos Touros Channel is narrower, but is equally easy to cross by keeping the village or the cape of Touro Grande to W. by S.

The coast, although it is low, may generally be seen from the outer edge of the banks, at from 10 to 12 miles off.

It is high water at Cape San Roque at $4^{h}\ 14^{m}$; springs rise 8 to 10 ft.

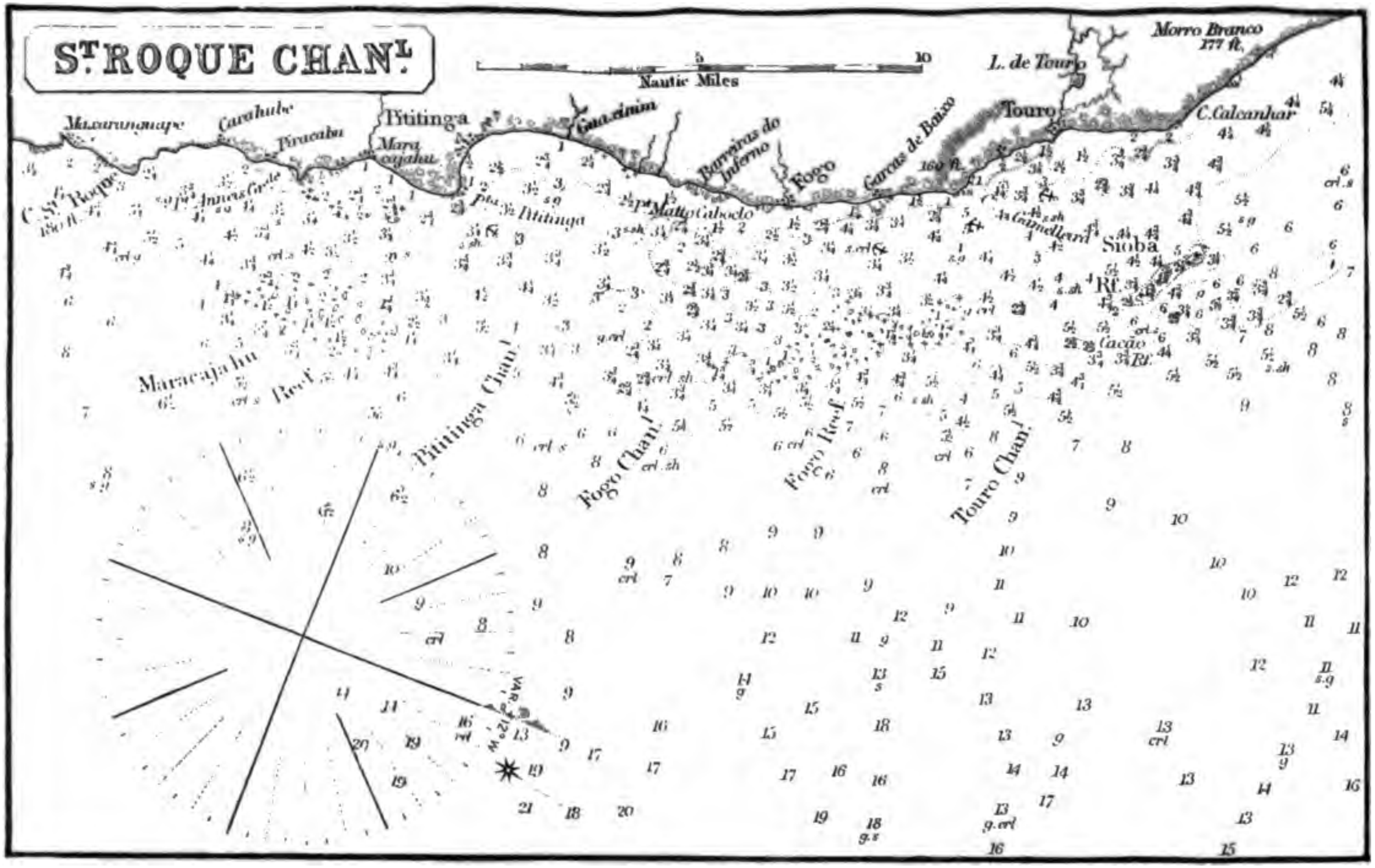
On advancing to the edge of the banks, soundings of light sand will be found, with an admixture of broken coral, and a sudden discolouration of the water from its oceanic blue to a green colour.

The COAST westward of Point Calcanhar runs to the W.N.W.; with the exception of Morro Branco or Cajueiras, and two small cliffs of a bright red colour, all this extent of land to Point Tubarao is low, and formed of sand downs, scantily speckled here and there by small clumps of cocoa-nut trees, which shelter the villages of fishermen.

Morro Branco, or *Cajueiras*, 3½ miles westward of Cape Calcanhar, is in lat. 5° 8′ 28″ S., long. 35° 32′ W., 177 ft. high, and visible at 17 or 18 miles distance. This small hill, in spite of its lowness, is the highest point on all this coast, and it is above all remarkable by its entire isolation, which makes it the best point for looking for. As soon as it is seen rising on the horizon, there can no longer be any doubt of the position of the vessel.

At 11 miles to the W.N.W. of Morro Branco there is a high sandbank, named *Ilha Décima*, very easily recognised by two large trees, or two green clumps which surmount it.

At 9½ miles W.N.W. of Ilha Décima is the village of *Cotia*, and 3 miles



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westward of Cotia is *Guajuru* village. At 1 mile westward of Guajuru the three points called Tres Irmaos begin; they are three declivities formed by small cliffs, lined with some rocks. To the West of the third is the hamlet of *San Alberto;* then, 3 miles farther off, the village of Caicara.

Caicara is situated behind a point of sand, under cover of which landing can easily be effected. From Caicara the coast becomes lower than it is to the East; not the least trace of vegetation is seen here. It turns to W. ½ S. to form the bay into which the *River Aguamaré* empties itself. This is encumbered with sandbanks, which have greatly enlarged within a few years.

At 7 miles westward of Aguamaré is a hill named *Mangue Secco;* it is the first high ground seen to the West of San Roque, and visible 21 miles.

From Aguamaré the coast, still consisting of very low shores bordered with sandbanks, trends N.W. by W. as far as Point Tubarao, offering nothing particular to describe.

Lavandeiras and Urcas Reefs.—The second group of the San Roque Reefs is situated to the westward of Point Calcanhar, between that point and Point Tubarao. These rocks are nearer the edge of the bank of soundings, and much more dangerous than the first group; they occupy a space E. by N. and W. by S. of nearly 40 miles, between the Urca Cotia and the Urca Tubarao, and have a breadth of from 12 to 15 miles. They are very steep-to from seaward; sounding is therefore of little use for giving warning of your approach to them. The water near their edge being green contrasts strongly with the blue water outside it.

Urca Cotia (pronounce it Cotilla, so as to be understood by the pilots) is situated 27 miles to N.W. ½ N. of Calcanhar, in lat. 4° 52′ 30″ S., long. 35° 49′ W. It is a group of rocky heads, with 9 or 13 ft. water over them, about 2 miles long East and West, and 1 mile broad; the sea almost always breaks over it.

Coroa Lavandeira Reef, the N.E. point of which is situated 3½ miles N.W. by W. of Urca Cotia, is a long line of breakers extending to S.W. by W., with a length of 12 miles, to the meridian of Caicara; it is steep-to on its seaward side, 6 or 8 fathoms of water being found at a few cables' lengths from the breakers. On the inside of the reef a large sandbank has formed, which leaves only a narrow channel between its South side and the shore, named the *San Alberto Channel,* which is used by vessels locally acquainted.

The German ship, *Von Roon,* in November, 1869, struck on a shoal of 18 ft., said to lie in lat. 4° 46′ S., long. 35° 57′ W., 7 miles northward of the East end of Coroa Lavandeira Reef, but this has not been confirmed.

Urca da Conceiçao is a reef 2 miles long, situated 1 mile to the N.W. of the N.W. end of the Lavandeira Reef; it breaks very heavily at times. A 9-fathoms channel separates them. There are some detached rocks to the S.W. of Urca Conceiçao, on which the sea often breaks. *Pedra Secca* lies between it and Risca das Bicudas; it is an isolated rock, awash at low water, which always breaks. On *Risca das Bicudas* there is a depth of 9 to 15 ft. at low water.

Urca Oliveira and *Urca Minhoto* are two isolated banks which are constantly breaking. The former is situated 6½ miles to W. by N. ¾ N. of Urca Conceiçao, and the latter 15 miles to N.N.E. of the mouth of the Aguamaré.

Urca Tubarao, in lat. 4° 51′, long. 36° 27′, is a bank of sand and coral, about 2 miles long, on which there is 13 or 16 ft. of water; it only breaks at low water, or when the wind is a little fresh. The fishermen say there is only 18 inches water over it.

COAST from TUBARAO to ARACATI.—From Point Tubarao the coast, still consisting of a low shore, extends to W. ½ S., and forms a bay in which several small rivers (of which the Amargosso is the principal) empty themselves. The hill of Mangue Secco, of which we have spoken before, separates the basins of the Rivers Amargosso and Aguamaré. The coast hereabout is lined with an extensive shore bank.

The *Rio Amargosso* or *Piranhas* is only frequented by Brasilian coasting vessels, who come here to take in cargoes of salt; they ascend about 4 or 5 miles, as far as the village of *Macau*. Vessels drawing 10 ft. cross the bar. About 21,000 tons of salt is annually exported, the price delivered on board being about 1*s*. for 317 lbs. At the Rio Amargosso the coast turns to N.W., and becomes a little more elevated. Some small wooded hillocks and cliffs are seen here, visible 15 or 20 miles; the most elevated is *Point do Mel*, 308 ft. high, and visible 20 miles.

The most projecting part of this coast which follows Point do Mel is called *Punta da Redonda*; it is 5 miles N.W. by W. ½ W. of the foregoing, and can be recognised by some hillocks 195 to 227 ft. high, crowned with five or six groups of trees. Anchorage may be found at a mile from this point in depths of 22 to 26 ft. Landing at the back of the point is easy enough when the breeze is not too fresh.

Joao da Cunha, or *Angerstein, Reef*, lies 10 miles N. ½ E. from Redonda Point. It is a dangerous reef, some of the rocks being occasionally uncovered. This may be considered the last group of rocks belonging to the San Roque Banks.

At 11½ miles to the West of Point Redonda is the mouth of the *Rio Mossoro*, where a flourishing exportation of salt was carried on by the Brasilian coasting vessels, but the bar is said to be gradually filling up the entrance.

The *Morro Dantas* appears as an isolated flattened cone, standing at the bottom of the bay of Rio Mossoro, but is scarcely of any use as a mark for navigation. It is visible 38 or 40 miles.

Retiro Grande Bay.—The natives call the reddish-coloured cliffs, 6 miles to the East of Point Grossa de Retiro Grande, *Punta Redonda*, and the bay to the West of Punta Grossa, Retiro Grande. There is anchorage in this bay, as hereafter explained, but westward of the anchorage it is blocked up with sand, and ought not to be approached within 5 or 6 miles when going from Punta Grossa to the bar of Aracati, 19 miles to the N.W.

ARACATI.—The first port of the Northern Coast of Brasil is that of Aracati, on the *River Jaguaripe*, or *Jaguaribe*, a place of some importance. The mouth of the river is in lat. 4° 25′ 35″ S., long. 37° 44′ W. The mouth of the river is easily recognised, both by its very projecting position, and by two small wooded sand-hills on the right bank, almost the same height; they rise on the horizon, like two islands close together, at a distance of 21 miles. There are some red cliffs on the left bank, which terminate at Point Massaio. This point is very remarkable by its singular shape, the under part of the cliff having been much washed away by the sea.

The bar is now only covered by 11 ft. at high water, and is liable to frequent alterations. It is narrow, winding, difficult of access, and dangerous. It can scarcely be crossed except by the aid of a steamer, the sea always breaking violently over it. Traffic was once almost completely abandoned at this port. In 1850, when the sanding up of the channel no longer allowed access to the river except to coasting vessels, the Brasilian Government put down the custom-house of Aracati as useless, but the place seems now to be rising again into importance.

The town of Aracati, containing about 9,000 inhabitants, was founded in 1723, and is 11 miles above the bar, on the right bank of the river. In spite of its bad position as a trading port, it exports, by the steam-packet boats of the Brasilian Companies, a large quantity of cotton, hides, a little vegetable wax, bones, leather, &c., &c., the total value of the exports in 1876 amounting to £76,256, of which cotton represented £72,979. Besides the packet boats, this port is still visited by 50 or 60 coasting vessels during the year, and in 1876 the port was visited by 20 foreign vessels, with a total tonnage of 1,720, of which 9 vessels of 1,070 tons were British.*

Remarks and Directions by Mr. Dixon.—Vessels from *Pernambuco* on the eastern coast bound to Aracati, proceed, in the first instance, to N.N.E., and then North, until they pass Cape St. Roque, and the parallel of the extensive flats, on the North coast, bearing the same name. Having passed these shoals, by running westward, in lat. 4° 40′, or thereabout, on approaching near enough to the shore, Point do Mel will be seen, composed of red cliffs and low white spots of sand on each side of them. This point must be avoided, for when it bore about S.S.E., at the distance of 13 miles, we were on a shallow bank, and farther to leeward the water appeared white, and, without doubt, was shallower. It is the Angerstein or Joao da Cunha Bank, which is dry in parts, and consequently very dangerous. Running along the shore north-westward, and keeping in about 6 fathoms, Point Reteiro Pequeño, formerly called *Cape Corso*, will be seen, and also a mountain, appearing blue, in the interior; the former appears red, being a large bank of red sand, and the latter resembles Bardsey Island, in St. George's Channel. When these two objects are in one, the *Retiro Grande*, or *Algebarana Head*, will be distinctly seen. The land to the south-eastward of this head for 3 or 4 miles has a very singular appearance, forming like two steps, the lower part being reddish, and the other grey. The head itself is rugged, and has a pinnacle close to its base, which, when bearing W. by S., will appear open.

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* By Imperial Decree, No. 6,063, the following alterations were ordered to take effect on the 1st of January, 1876, in the several custom-houses of the empire.

1. The anchorage dues on foreign merchant ships arriving in the ports of the empire are abolished, and are replaced by the following tax on foreign vessels, to be called lighthouse dues, viz.:—On vessels of 200 tons, 20 milreis; 200 to 400 tons, 30 milreis; 400 to 700 tons, 40 milreis: of more than 700 tons, 50 milreis.

2. Steam-packets belonging to the regular lines coming from Europe or America, of the North, the Pacific or River Plate, will pay the lighthouse dues in the two first Brasilian ports they may touch at, for which payment they are to demand a certificate to avoid further payment in the other ports.

Vessels which shall have paid the lighthouse dues six times during the first financial six months shall not be obliged to pay any further dues during the second financial six months.

3. For the payment of such dues the registered tonnage of the vessel will be accepted and should such vessels not be registered by the ton, but by some other system, then the capacity of the vessel will be calculated in tons at the rate of 2·83 cubic metres.

At the distance of about a mile there are several rocks, of which the outermost is covered at high water. It is necessary, therefore, to give this head a good berth, until a large lump or hill, situated on the S.W. side of *Retiro Bay*, is brought to bear S.W.; then steer toward the hill until Retiro Head bears S.S.E. With these bearings there is safe anchorage in 3 fathoms water; or, if the vessel's draught will admit, you may go farther in, and have smooth water, as the rocks off the head break off much of the sea.

Here vessels bound to Aracati generally lie at anchor, while the master proceeds thither overland to inform his consignee of his arrival, draught of water, &c. There is a house at the bottom of the bay for the accommodation of travellers, and farther up the valley are some others, where a horse and guide may be procured. The distance from this place to Aracati is about 21 English miles, and a great part of the way is along the sea shore. The course from off this anchorage to the bar of the Jaguaripe is about N.W. ½ N., and the distance 20 miles.

The land in the vicinity of the bar is very barren. On the North side of the entrance is a high red bluff, and also two rocks close to the water's edge; one of these has the appearance of a large gun mounted, with a small fort and flagstaff, and some huts close to it. These objects, together with a spit of sand on the S.E. side, the breakers across the mouth of the river, and the smoothness of the water within them, are good marks by which the entrance may be readily known. About half an hour before high water is the best time for entering, but the channel over the bar must be marked by a boat or buoy, or a pilot be engaged. From February to July anchorage may be had in 4 or 5 fathoms about a mile off the bar, but at other times it is unsafe.

Sailing out of this port is more dangerous than coming in, as the wind is only favourable for passing the bar during three hours in the morning, and even then it cannot be depended upon. Should it fail, or head in the least, the vessel would be in imminent danger, as a heavy sea is always running on the bar, and the channel is so narrow that anchoring would be useless. When a vessel has been conducted through the *Funnel*, and as far down as the lowest perch, and being on the starboard tack, as much canvas should be set as she can carry, in order to give her good way over the shallowest part and through the breakers.

No vessel should attempt to go out if it has been blowing hard the day before, as a heavy sea will then be on the bar, and probably the breeze not regular.

According to the pilots and inhabitants of the place, the channels often shift;* the banks being composed of quicksands, the river, when swollen with rains, forces its way through them in various directions, and sometimes forms new channels, so that there is no certainty of their being long in one position. It is also affirmed that the channel is seldom deep enough till after the river has been raised by continued rain, and that in the dry season vessels may be detained for months for want of sufficient water.

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* If a pilot be on board, care should be taken that, from his ignorance of the English language, he does not confuse the helmsman; a single mistake might prove fatal.

The Tide and Current have been already noticed.

Commencing at about 9 miles from the River Jaguaripe, the land, for nearly 12 miles, close to the sea, appears dark and full, with several openings close to the bays. At about 1½ mile from the commencement of these openings are some white cliffs, in shape like a schooner with all sails set, and head at East. So soon as this full land terminates, the coast assumes a more flat and level appearance.

Coast from Aracati to Ceara.—From the bar of Aracati to Cape Iguapé, 43 miles to N.W. ½ N., the coast is straight and clear, but uninhabited; it can be approached to within 2½ or 3 miles, in depths of from 19 to 26 ft. No points worthy of observation are met with, except some wooded hillocks 260 to 325 ft. high. Inland are the several mountainous ranges, named *Monte Azul*, *Monte Cascavela*, 590 ft.; *Monte Canaveiros*, *Aratanha Peak*, 2,559 ft., and *Mount Masaranguape*, the loftiest, 3,018 ft., which is 21 miles W.S.W. from Point Macoripe. The currents running to the N.W. are stronger on this coast than on that which is to the East of it.

Cape Iguapé, in lat. 3° 56′ 45″ S., long. 38° 16′ 23″ W., is a projecting point, 394 ft. high, and more elevated than the surrounding land; it is formed by a large bluff, whose N.E. side is hidden by sandbanks, very apparent in coming from the East.

To the westward of Cape Iguapé, *Iguapé Bay*, about 15 miles to the southward of Ceara, forms a small harbour. The bay is surrounded by very high perpendicular cliffs, against which the sea breaks at half tide; it has a high round rock, behind or within which is shelter and anchorage in 2½ or 3 fathoms. To the N.W. of this bluff rock you may anchor in the very roll of the sea, as it has 4 and 5 fathoms; and on the strand are pits for watering.

A straight coast follows Cape Iguapé as far as Point Macoripe; it is formed of banks and small hills, 160 to 260 ft. high, some of which are wooded. This coast can be approached within a mile, in a depth of 5 fathoms, except in the neighbourhood of the *Caxoeira Reef*, which lies just midway between Cape Iguapé and Macoripe Point. This reef is 1½ mile from the coast, 3 or 4 cables' lengths across, and the sea only breaks over it at low water and when the wind is fresh. From it Macoripe lighthouse bears N.W. by N. ½ N., 9 miles. To avoid it, keep outside of the line of Cape Iguapé with the Macoripe lighthouse, about 2 miles from the coast.

The *Rio Pacoti* flows out 2 miles to the West of Caxoeira Reef; its entrance is very easily recognised by a great point of sand with a hill, 130 ft. high, which forms the S.E. point of the mouth of the river, 3 miles above which is the town of *Aquiraz*.

The only remarkable objects before coming to Point Macoripe, are the Morro Carauta, 195 ft. high, and the bar of the Rio Coco, recognisable by its small red cliffs.

Macoripe Lighthouse.—Macoripe Point, forming the East boundary of Ceara Bay, is the end of a chain of downs, about 225 ft. high, which end in a neck of sand, on the extremity of which stands the lighthouse, 50 ft. high, showing a *bright revolving* light every half minute, elevated 85 ft., and visible 12 miles. Position, lat. 3° 42′ 5″ S., long. 38° 27′ 30″ W.

This point is bordered by some reefs under water, which do not permit doubling it at less than 5 or 6 cables' lengths. The point does not project far enough to shelter the roadstead of Ceara; but on its West side there is a small and rather deep bay, in which is found 3 to 3½ fathoms of water, with good protection from the winds and the sea to the East.

The land within Point Macoripe is a high and irregular sand hill, terminating in a point, which has a battery and tower near the extremity. Ships advancing from the N.E. should not approach the point nearer than 2 miles, and should choose a berth without the points which form the bay.

CEARA, or FORTALEZA, is the most important town upon this part of the coast. The bay on which it stands is formed by Point Macoripe to the eastward, and by the River Papina to the westward, an extent of about 9 miles; its greatest depth being about 3 miles.

The province of Ceara, bounded to the East and South by the provinces of Rio Grande do Norte and Piauhy, has a coast line of upwards of 250 miles, and an area of about 50,000 square miles, the population of which, in 1875, amounted to 721,686.

The town of Ceara, called Fortaleza, or Na. Sa. d'Assumpçao, by the natives, is a beautiful city, situated on an elevated plateau, 70 to 100 ft. above the level of the sea. It is the only town of the whole Brasilian coast which can be said to be regularly and properly built; some straight streets very well paved, lighted with gas, a few monuments, and several places ornamented with fountains, give it an aspect of good-keeping very seldom seen in Brasil. Tramways are in operation in the streets. The town has upwards of a thousand houses, of which a great number are two stories high; its population is 18,000 or 20,000 inhabitants, and 35,000 if the outskirts are included. It is the seat of the provincial government. There are several very simple means of improving the port; but, to put them into execution, more energy and enterprise is needed, which are never met with in these countries. The town is defended by a small fort, in very bad condition, which has never been finished. Near it are some barracks, to accommodate 300 or 400 men. A railway is in operation to Canoa, 55 miles distant, with a branch of 4½ miles to Massaranguape; it is to be extended to Baturité, 6 miles from Canoa. Ceara is in *telegraphic* communication with Europe, and with the Brasilian telegraph system. Two British steamers from Liverpool call here every month, and the Brasilian coasting steamers make frequent calls.

The principal exports are cotton, hides, bones, india-rubber, coffee, and sugar, the total value of which in 1879 amounted to £104,385; the imports for the same year, chiefly consisting of Manchester goods, hardware, &c., amounted to £312,471. In 1879, fifty-five British vessels, with a total tonnage of 28,704, arrived here, besides 114 vessels of other nations, with a tonnage of 30,863.

The settlement formerly was at *Papina*, to the north-westward, where there is a narrow creek and the remains of an old fort.

Provisions and everything here were very dear; coal costs 84*s*. per ton, and each jangada can scarcely carry more than a ton at a time. Good fresh water is brought down to the beach in pipes, and boats can be filled, when lying outside the surf, by means of a hose attached to the hydrant near the flagstaff. Landing here is difficult on account of the reef and surf, but in the Bay of Macoripe communication with the land is very easy.

The anchorage is an open road, where you are exposed to the wind and the swell from East round by North to N.W. But as there is never any other bad weather in this part, except squalls in the rainy season, which do not last long, you are quite safe, even at the anchorage outside the principal road, about 2 miles to the N.E. of the town.

Ceara Bay is strewn with several rocks, requiring some attention when coming to anchor. It is useful here to describe their position, because the buoys which point them out are very badly placed, and may at any time disappear by accident or negligence.

Meirelle Reef.—The most easterly of these banks is the Meirelle Reef, situated 1½ mile West from Macoripe Point. It is formed by two beds of rocks, separated by a narrow channel. The sea breaks over it at low water, and when the sea is a little rough. The least depth of water that is found here is 6 ft., with bottom of coral; a *white buoy* is moored in 4½ fathoms, 1½ cable N.N.E. from the eastern reef. *Estrella Bank*, of from 1½ to 2 fathoms water, is a sand-spit jutting out from the shore, to the S.W. of the Meirelle Reef. A depth of 3 or 4 fathoms of water is found in the channel between these banks.

Velha Reef, having 9 ft. water over it, is a small bed of isolated rocks, about 4 cables long, North and South, and 1 cable broad, 1½ mile North of the town. It is pointed out by a *red buoy*, moored about 2½ cables to the North of the bank. The sea breaks here at half tide, and when the wind is fresh.

Coroa Grande Reef, situated to the North and N.W. of the town, is three-quarters of a mile long S.E. by E. and N.W. by W., parallel to the coast, and a quarter of a mile broad. It forms with the shore-bank a channel 1½ cable broad, and 16 to 19 ft. deep, which constitutes what is called the Port of Ceara. But as there is 1½ to 2 fathoms of water on this reef, it gives no protection, and when the sea is high and the breeze fresh, the swell is felt almost as strong as in the open roadstead. The East point of the reef, which forms the West side of the entrance to the channel, is pointed out by a *red buoy*, moored about a cable's length without the first breakers.

To avoid these reefs when anchoring to the West of Macoripe Point, you must not bring the lighthouse to bear to the eastward of E.S.E.

The eastern side of the channel is bounded by the *Do Porto* or *Harbour Reef*, which extends obliquely to the coast, forming a small bay between it and the shore. On it is a small badly constructed landing-place.

Tides.—The current of the tide is feeble in Ceara Bay. High water, full and change, at $5^h\ 35^m$; springs rise 8 ft. 2 inches.

Making the land at Ceara is rendered very easy by the four high mountains which surround the town from the South to the W.N.W. at 10 or 12 miles distance. These are the only mountains that are seen near the sea-coast on all the North coast of Brasil. The highest, *Massaranguape*, 3,018 ft., rising about 16 miles S.S.W. of the town, is visible in approaching from the N.E. while you are still 40 to 45 miles from the coast. In that direction, four great mountains are seen separated from one another. The easternmost one is the *Morro Atanha*, 1,000 ft. high; the second is Massaranguape; the third the *Morro Jua*, 2,000 ft. high; and the fourth, the *Morro Cahuipe*, 1,247 ft high, is the most westerly and the smallest.

Anchorage.—It is very easy to anchor in the roadstead; in coming from the East or N.E. you should steer towards the town, so as to double Point Macoripe at a half to three-quarters of a mile distant, and anchor 1½ mile to N.E. of the town in depths of 5 or 6 fathoms, sand or gravel, keeping Point Macoripe to the South of E. by S. ½ S. Before anchoring, you must take care to ascertain the nature of the bottom, as there are several rocky places, especially a little to the West of the point which we are describing.

At this anchorage you will be three-quarters of a mile to N.W. of Meirelle Bank, and 1½ mile to E.S.E. of Velha Reef. The holding is very good where the bottom is sand or gravel. There is a good and secure anchorage to the West of Point Macoripe close to the shore, in 4 fathoms, its only disadvantage being the distance from the town. The best berth is with Macoripe Point bearing E. by N., and the centre of the village of Macoripe S. ½ W. You will avoid the Meirelle Reef by not bringing the village to bear South of S.E. ½ S.

In coming from the West to anchor at Ceara in a sailing vessel, you must bear off to the East of the meridian of the town, and at some miles from the coast, to double Velha Reef, and only make for the anchorage when the town bears S.S.W. If you arrive at night at the anchorage of Ceara, you must anchor to the N.W. of Macoripe lighthouse, at 1½ or 2 miles distance, in depths of 7 or 8 fathoms.

The pilots come on board when the vessel is at least 2 miles distant from the anchorage.

In entering what is called the Port of Ceara, that is to say, the small channel formed by the Grande Reef and the shore, you must have recourse to pilots, not only becouse it is obligatory, but also because the channel is narrow, and the harbour so small and sometimes so encumbered by ships, that you cannot moor without the aid of pilots. There is a depth of 3 fathoms in this harbour at low water. Sailing vessels always enter by the East, and go out by the West channel; the former channel has a depth of 2½ fathoms at low water.

The mark for entering the East channel is the two steeples of the cathedral in line; keep them so till you are abreast of the red buoy, then steer a little to starboard, and anchor abreast the West part of the town. It is only at low water that landing can be effected without danger; and great care must be taken in doing so. With a whaling boat or a light boat and some skilled sailors, landing can easily be effected at high water by running aground on the sand, and quickly hauling the boat to land, but the least awkwardness would overset the boat. Landing is only possible for two or three hours at low water.

To the westward of Ceara the coast is formed alternately of sand downs and small cliffs, 60 to 100 ft. high, wooded hills appearing at one or two places in the interior. As before stated, the mountains of Ceara form an excellent mark for this part of the coast.

Just to the westward of Ceara the Ceara River enters the sea, and 12 miles beyond this the *River Cahuipe* enters the sea just to the North of the mountain of the same name; it is not navigable.

Passem Point is remarkable from the wooded hills upon it, which are visible from the road of Ceara. A reef projects half a mile from the point, and forms a breakwater to the landing-place at the village, which lies a little to the West, between two large sand downs. At 5 miles West from Point Passem, and 2 miles in the interior, is a small hill, and North of this the *River Pericuara* enters the sea.

At 9 miles westward of the River Pericuara is *Point Curimicuara*, the most salient point of the coast. It is formed of sand downs, and may be known by a conical wooded hill a little within it. This point is encircled by a reef extending 2 or 3 cables from it. In the bay, to the West of it, is good anchorage for coasters, near the mouth of the Rio San Gonçalo. A *lightvessel* is reported as lying off the mouth of this river, showing a *fixed bright* light.

Point Parazinho, a low sandy point, forms the right bank of the *River Curu;* this river will be recognized by the red cliffs to the West of it, on which will be seen the village of *Laguinha*. Good anchorage for coasters will be found on Curu Bay, to the westward of the river.

At 12 miles N.W. ½ N. of Parazinho Point is *Point Freixeras*, with some trees on it; and 4 or 5 miles farther (lat. 3° 11′ 10″, long. 39° 20′ 48″ W.) is the hill of *Point Mundahu*, which appears as an island. This is one of the best marks on the coast, not only from its height and isolation, but also from its appearing white when viewed from the eastward and black from the westward. It is visible 20 miles off, and very useful as a mark when the high mountains of Uruburetama, 30 miles inland, are obscured by mist or rain.

Mundahu.—The entrance of the River Mundahu is in lat. 3° 10′ 30″ S., long. 39° 22′ 28″ W. Point Mundahu is surrounded by a reef, which, towards the West, is separated from the coast, and forms an excellent harbour of from 10 to 13 ft. depth, for three or four coasters. A new village was constructed here a few years ago, and seems likely to prosper. The River Mundahu enters the sea at 1 mile westward of the village, and has its source in the Serra Uruburetama, running through a fertile country. You can anchor within 1 mile of the coast, in from 3½ to 4½ fathoms.

From Mundahu to Point Patos the coast is straight in a N.W. ½ W. direction for 21 miles. It is wooded, and bordered by several sand-banks, on which are some fishing sheds. You will pass, in sailing along this coast, the small hills of *Morros Baleia*, visible 14 miles off; the *Morros Sabiaguaba*, also wooded, visible 16 miles off; and the fishing villages of Bomjesus, Quatigaba, and Pernambuquinho. *Point Patos* is well marked by a high, bare sand down, visible 16 miles off; just to the westward of it the eastern branch of the River Aracati enters the sea, which is navigable only for very small vessels. The other arm, *Aracati Mirim*, enters the sea 9 miles to the N.W., the coast between being formed of sand downs, on the highest part of which is a pilot's mast.

To the westward of the Aracati Mirim the coast is a little more regular, and formed by cliffs, on the summit of which will be seen the church of *Almafola*, in a group of cocoa-nut trees, which may be seen 20 miles off.

At Almafola, or Almufedas, commences the bank of Acaracu, which surrounds Point Tapage, and extends as far as Point Jericoacoara. This bank, composed of sand and mud, has a depth of 10 ft. at 4 miles from the point, and 5 or 6 fathoms at 10 or 11 miles off. The coast is low about *Point Tapage.*

About 30 miles inland to the S.W. of Point Tapage are the *Serra Mocuripe.* The most remarkable of this chain is the *Curral Grande,* 2,700 ft. high, the summit of which appears as a saddle.

River Acaracu.—Approaching the coast on the meridian of the Curral Grande, you will find it low and wooded; and when within 7 miles of it, the houses at the entrance of the River Acaracu will be seen. At 2½ miles from the entrance of the river, in 10 ft. water, a buoy is moored at the entrance of the channel, which is marked out by stakes. There is about 13 ft. water over the bar, and 20 to 24 ft. higher up the river, abreast the village. The commerce of this port, which consists of cotton, salt-fish, &c., is nearly all carried on by the Brasilian packet boats.

Large vessels passing along this coast, should keep 12 miles off, in depths of 7 to 8 fathoms, and not sight the coast, in order to avoid the banks of Acaracu, which slope gradually to the shore. Beyond Acaracu the coast is formed of sand downs and small wooded hills; within them, to the S.W., will be seen the sharp peak of the Serra Tiaia.

CAPE JERICOACOARA, lat. 2° 47′ 10″ S., long. 40° 29′ 30″ W., is the only elevated land close to the sea between San Roque and Maranham. It is formed of two rounded hills, 360 and 280 ft. high, visible 23 miles off; the coast hereabout only being visible 15 or 16 miles off, thus makes the hills of the cape appear as an island.

To the westward of the cape, the coast turns to the southward for 2 or 3 miles, forming a deep bay, where small vessels find good anchorage in 16 to 18 ft. at 1 mile W.S.W. from the cape; the bottom is of fine sand. The depths gradually decrease up to the shore. This is one of the best anchorages on the coast—better sheltered from easterly winds than Ceara. Landing is easy under shelter of the point. Cattle and poultry might be procured at the village, but a few days' notice would be necessary.

River Camoçim.—At 10 miles W. by S. ½ S. from the anchorage of Jericoacoara will be seen a large white down, visible 16 miles off; and 5 miles farther two low and flattened hills, which form the eastern side of Camoçim Bay. The Camoçim River has its source in the hills of Hybiapaba, 25 miles to the southward of its mouth. The entrance of this river is easily found by the high mountains on the coast hereabout, the highest summit of the Hybiapaba range lying S.W. from the bar. A buoy marks the entrance of the channel, which is staked. This river was more frequently visited formerly, but now, in consequence of the sanding up of its mouth, the trade to the port is only carried on by the packet boats.

A railway is in course of construction from Camoçim to Sobral, a distance of 95 miles in the interior. The town is about 3 miles above the bar, over which there was said to be 15 ft. at spring tides in 1879.

At 15 miles West of the River Camoçim is the bar of the *River Tapuiu,* or Dos Remedios, of little importance; the coast between has several breakers off it at 2 miles distance. At 8 miles N.W. from the bar of the River Camoçim, and 10 miles from shore, lies a bank of 2¼ fathoms, sand, having depths of 5 or 6 fathoms around it. This bank has not been thoroughly examined. *Das Almas Point,* 10 miles beyond the River Tapuiu is on the eastern side of a bay, 10 miles wide, into which fall the rivers *Timonha*, *Ubaluba*, and *Camaropim*. The sand-banks formed in the front of these rivers have completely obstructed this bay, depths of only 6 to 9 ft. being found at 4 miles off the shore, which is very low between these rivers, and scarcely visible 6 or 8 miles off.

RIO PARANAHYBA, or Pernaibao, &c.—This river is one of the largest in Brasil, and in a commercial point of view, is of the highest importance. It is formed by three streams of the same name, that take their rise in the borders of the Sierra, which bounds the province of Piauhy on the S.W. [Lat. 10° 45′ S.] The portion of coast between the *Barra Velha d'Iguaraçu*, the easternmost branch, and the *Barra de Tutoia*, its westernmost, has generally been exhibited very incorrectly in the charts. The distance between the mouths is about 40 miles, within which extent the Rio Paranahyba discharges itself by four others, namely, the *Barras das Canarias*, *do Meio*, *do Caju*, and *das Carapato*. All these openings are formed by a group of low wooded isles, composing the *delta* of the Paranahyba, and five of which, next to the sea, afford excellent pasturage for cattle.

It is said that for nine months in the year the land here is enveloped in haze, which, added to the heavy sea and strong westerly current which constantly prevails, renders caution necessary when approaching it. In fact, so uniform is the coast that the pilots frequently mistake one point for another. The water is very muddy off the mouths of the river.

Barra Velha d'Iguaraçu, or Amaraçao, the principal and easternmost mouth of the Rio Paranahyba, is situated at 15 miles westward of the Barra Camaropim. This is the only port on this part of the coast which is visited by foreign vessels, which come here to take off cattle, cotton, &c., to Cayenne. They anchor 1½ mile N.E. of the entrance, in 4 fathoms of water, and three-quarters of a mile without the breakers, to wait a favourable opportunity to enter. Vessels drawing more than 10 ft. water are not able to enter, except at very high tides. At *Amaraçao*, a village on the East bank of the river inside the bar, it is high water, full and change, at 5^h 15^m; springs rise 11½ feet.

Light.—On *Punta Pedra do Sal*, on the North side of Great Island, and 5 miles W.N.W. from the Barra Velha d'Iguaraçu, is shown a *fixed bright* light, visible 10 miles. Position, lat. 2° 49′ 19″ S., long. 41° 43′ 15″ W.

A sand-bank in the middle of the entrance divides the channel into two, one running North and South, and the other East and West. The North channel is the best and deepest, being marked by two buoys and some stakes. There is a depth of 16 ft. in it at high tides; the other channel having only 12 ft. According to a survey by Captain Kaas, 1876, the channels have much altered, and have a depth of about 11½ ft. at springs. Entering is easy, as the prevalent winds blow from the North and East; but in getting out, vessels must profit by the land winds, which blow at sun-rise, taking great care, as the channel is winding.

The bar being open to the prevalent winds breaks heavily, especially with ebb tides, which run to the North. The change in the sand-banks are frequent and rapid.

Were this port not so difficult of access, an important commerce would open up, as the land of the province is fertile. The chief place, *Paranahyba*, is situated at 10 miles above Amaraçao, which is the shipping place. At Paranahyba there are several European establishments for the sale of cattle, &c. The other exports are cotton, tobacco, hides, wool, fish, glue, &c. At 3 or 4 miles above Paranahyba is the spot where the river divides, and thus forms its extensive delta.

Theresina, the capital of the province, is situated about 300 miles above the mouth of the river. A small steamer goes once a month from Amaraçao to the capital, and for about 180 miles beyond.

The appearance of the islands forming the delta of the Paranahyba is wooded toward the sea, with here and there some bare sand downs, which generally indicate the entrance to the different branches of the river. At 6 miles N.W. from Amaraçao you will see a small hill, which forms a cape named *Punta do Sal*, on which is the light previously described. Here begins a large bay named *Praya da Fragata*, in remembrance of a ship wrecked in this bay. A small head of rock, 200 ft. in diameter, named Pedra do Sal, lies 1½ mile N.N.E. of the cape. The rock uncovers about 6 ft. at low water, and a depth of 5 fathoms is found without it.

Barra Canavieiras, or *Canarias*, the second entrance to the River Paranahyba, 13 miles N.W. from the Barra Velha d'Iguaracu, is completely blocked up by a line of breakers across the entrance. The East point of the entrance is named Punta do Potro. A depth of 5 fathoms is found at 2 or 3 miles without these breakers.

At 2 miles westward from the preceding is the *Barra do Meio*, which may be known by there being a sand down on each side of its entrance. This is the narrowest entrance. Seven miles westward of the last in the *Barra Caju*, situated at the bottom of a bay 5 miles wide; without this bay is a line of breakers right across its entrance. These breakers may be approached within a distance of half a mile in a depth of 3 fathoms. The Barra Carapato or Carnahuba, 7 miles to the westward, is also encircled by breakers, which lie about 2 miles without the land; but midway between the Barra Caju and Carapato the land may be approached within half a mile in 2 or 3 fathoms.

Barra Tutoia, the sixth and western mouth of the River Paranahyba, lies about 9 miles beyond the Barra Carapato. This is the only entrance where vessels of 18 ft. draught are able to enter at all times of the tide, and find as good anchorage as in all the North coast of Brasil between Pernambuco and Maranham. This place is only visited at present by a few Indians, who come here and establish huts on the shore during the fishing season. In making the Tutoia entrance, it will be best to make the land to the eastward at Jericoacoara. The wooded foreshore terminates sharply at the eastern side of the entrance; the land to the westward being formed of sand downs.

The entrance faces the North; the left bank being formed by the coast bank running East and West, the right bank by a sand-spit jutting out from Papagaio Island towards the West. The entrance channel is close to the West of this sand-spit, and is very narrow, opening towards the N.E. On the western side of the channel the entrance is bounded by breakers, which extend from the shore to the westward.

Wishing to enter Tutoia, in coming to depths of 4 or 5 fathoms, on the meridian of the Barra Carapato, you will see the low shore, which follows the wooded shore to the West, and also the breakers which lie to the westward.

Between these breakers and the sand-spit is the channel, about half a mile wide, and 3 to 4 fathoms deep. You can approach the low shore within a cable's length, sounding all the time, leaving the breakers to starboard. There is never less than 20 ft. water in the channel; you round the point, steering S.W. and South, and anchor in about 3 fathoms when the point bears N.W. You will then have a sand-bank to the South or S.E. of you, which dries at low water.

You can go 5 or 6 miles farther up the river by passing to the West of this bank, and anchor in 5 or 6 fathoms; but for a short stay the first anchorage is the better.

As there may be some difficulty in finding the entrance in coming from sea, it will be preferable to anchor in 4 or 5 fathoms, to the North of the termination of the wooded coast, and East of the breakers, and send a boat to examine the entrance. This will be more advisable when there is a high sea, as at times the sand-spit is nearly covered by water. It is high water, full and change, at the bar, at 5^h 15^m; springs rise 12½ ft.

Captain Mouchez, from whom we take this description, says:—When we arrived off Tutoia, in the *Piquet*, our Brasilian pilot, although an old pilot of the coast, only knew this port by name. I was obliged to examine the entrance in a boat before entering. It is very remarkable that this fine port, so easy of access, so happily situated in the middle of an unsheltered coast, and at the entrance of a large river by which trading with the interior would be very easy, should be almost unknown; while the small port of Amaraçao, 30 (40) miles East of it, is much frequented, although every time a ship enters she runs the risk of being lost in crossing over the bar."

The Harbour of Tutoia may be entered by the largest vessels which frequent this coast without a pilot, by sending a boat to examine the channel previously. Having rounded the point, you find a perfectly safe harbour. Capt. Mouchez tried in vain to reach the village of Tutoia; but having no guide, he became lost in the river, and returned. Fish and game are abundant, and water may be obtained. The only inconvenience is the marsh fever, but this will not affect a stay of only a few days.

The coast between the Barra Tutoia and Perguiças River, 30 miles to the W.N.W., is formed of white sand-downs and clumps of trees, the most conspicuous of the latter being the Matto de Saint Cosme, 1 mile inland; and being higher than the surrounding coast appears as an island. There are several unimportant rivers in this piece of the coast. In coming from the eastward, *Perguiças Point* may be easily known by the alteration of the direction of the coast; but in approaching from seaward it is more difficult, even those accustomed to the coast being unable to know with certainty their position by the appearance of the coast.

Between Perguiças and Maranham the coast is very low, and bordered by sand-banks at 6 or 8 miles off, making it very dangerous to approach. It is best to keep out to sea directly the shore appears on the horizon, as there is great difficulty in telling your distance from shore, and a false estimate might cause your vessel to be stranded. Sounding is not a certain guide, as the banks are steep-to. In the night do not stand into less depth than 15 or 20 fathoms. The currents increase in strength the nearer you approach Maranham.

Perguiças or Emily Reef.—This bank, in lat. 2° 30′ S., long. 42° 45′ W., is 3 miles long East and West, and 1½ mile North and South. It has 1 to 1½ fathom water on it, and breaks at low water, or when the sea is a little rough. The soundings around it are very irregular. Between it and the coast is a channel, sometimes used by small vessels; it has depths of 2 and 2½ fathoms in it at places. At 4 miles N.N.E. from the Perguiças Bank, and 9 miles from the coast, is an isolated spot of 3¾ fathoms.

Barra Perguiças.—The entrance of this river is situated on a prominent bend in the coast, as before stated. On the East bank of the river the coast for 2 miles is sandy, causing a break in the usual appearance of the coast. On the West bank is a prominent clump of trees, visible 13 miles.

The direction of the entrance of the river is N.W., but the entrance between the banks is N.E. and S.W., and, like all the entrances on this coast, is divided into two at its outer part by an isolated bank. Perguiças was much frequented formerly; now it is nearly abandoned. Anchorage, in good holding ground, may be found without the entrance, in depths of 3, 4, and 5 fathoms.

Lançoes Pequenos, and Lançoes Grandes.—The coast to the West of the mouth of the Perguiças trends to N.W. by W. ½ W., on an extent of about 40 miles. It somewhat resembles that which precedes it to the East. Its downs are of shifting sand, of a moderate height, and their extent very nearly 36 miles. Nothing can more resemble white sheets extended on land; and this aspect is very remarkable, and useful as a landfall, to those coming in from sea, when bound to Maranham, &c.

These downs become visible at 10 or 11 miles distance as a white streak on the horizon; but approaching within 6 or 8 miles of the coast, you can distinguish some small hills and a few clumps of bushes; but, as before stated, it is better to keep out of sight of the land, in order to avoid the dangers lying off shore. The most remarkable point on this coast is the small black isolated hill, *Mamelon*, on the right bank of the Rio Negro. It has steep sloping sides, covered with trees, which will well distinguish it from the gently undulating sand hills. At the Rio Negro also, you will see some clumps of trees inland. The *Lançoes Pequenos* extend from the Perguiças eastward to the entrance of Tutoia lagoon; the *Lançoes Grandes* to the westward of the river.

An isolated bank of 2¾ fathoms lies N. by E. ½ E. 5 miles from the mouth of the Rio Negro; between it and the coast are found depths of 4 to 5 fathoms. Many breakers exist at from 1 to 2 miles from this coast.

The *Morros Alegres*, near the western end of the Lançoes Grandes, are 4 or 5 hills, a little higher than the sand hills hereabout; but as a mark for clearing the Cruz Bank, Capt. Mouchez says they are not to be trusted, being so little different in appearance. The *Morro Viado* bears from the Cruz Bank W.S.W., and is just visible from it. It is a small wooded mountain, 5 miles inland; and, being the only high ground near this coast, is easily recognisable.

Point Mangues Verdes, in long. 43° 18′ 15″ W., is the western termination of the Lançoes Grandes, and may be approached within 1 or 2 miles, in depths of 4 or 5 fathoms. This would be a good station for a lighthouse, to point out the position of the Cruz Bank, and also the reefs of Sta. Anna. Beyond Point Mangues Verdes the coast, which is wooded, turns to W. ½ S. for 7 miles to the low and wooded point of *Mangues Seccos*. Between these points are two small rivers, and inland the Morro Viado. To the West of the Lançoes Grandes the coast entirely changes its aspect. Instead of being arid, and devoid of verdure, it now appears as if wholly covered with bushes and groves, so closely set that, at the distance of 5 miles, the ground between them is not to be seen. The shore is low, and is called the *Praya das Mangues Verdes*, or *Beach of Mangroves*. The sudden transition of colour here, from that of the Lançoes, renders it impossible to mistake this portion of the coast. Off Point Mangues Seccos commence the reefs of Sta. Anna. The anchorage within this point is described hereafter.

Cruz Bank.—This most dangerous bank, on which many vessels have been lost, lies 6 miles from shore, on the outer extremity of a group of sand banks and low rocks extending from the Morros Alegres. These banks are very steep-to, 10 or 11 fathoms being found just outside them. Through the banks there are several channels of 4 or 5 fathoms, in which vessels have sometimes been entrapped, and generally received much damage in finding their way out. The only guide to know when you are near the banks is the state of the sea, which breaks heavily, and will also give a warning at night by the noise it makes.

SANTA ANNA ISLAND, and LIGHTHOUSE.—When in coming from the East you reach the meridian of Viado Hill, you will see on the horizon, to the westward, the coast of Sta. Anna Island, covered with trees, and to the left of the trees the lighthouse, appearing as a sail. The position of this light is badly chosen, as the reefs extend 10 miles to the East from it, and the light is only visible 14 miles in clear weather; the light is also obscured by the North part of the island (which would have been a much better position for it), when brought to bear eastward of S.S.E. On the North point of the island are some small cliffs. Between the island and the main are some other islands, having intricate channels between them, frequented by small vessels.

The lighthouse is a square white tower, 80 ft. high, showing a *bright* light, which *revolves every* 32 *seconds*, at 70 ft. above the sea, and visible 14 miles in clear weather.

Santa Anna Reefs.—The most salient point of the Sta. Anna Reefs is Cesar Bank, lat. 2° 14′ 45″ S., long. 43° 27′ 28″ W., and 9 miles E. ½ N. from the lighthouse. From this point the reefs form a girdle of coral, extending to the westward, round the North part of the island: and to the southward to abreast the point of Mangues Seccos. There are several openings through this chain towards the East, and the depths within it vary irregularly from 1 to 7 fathoms. Outside it is steep-to, 13 or 15 fathoms being found almost close up to the breakers.

Anchorage.—The most practicable passage through these reefs is that running in between the reefs and Point Mangues Seccos to abreast the mouth of the *River Preha*, which enters the bay at about 1½ mile South of the point. The least depth in this winding channel is 3½ fathoms; and having passed about 4 or 5 miles through the channel, you will find a most excellent anchorage, about 2½ miles W.N.W. from Point Mangues Seccos, well sheltered from wind and sea. In passing through the channel it will be prudent to send a boat on before. Anchorage may also be found off the entrance of this channel, 3 miles from land, in 5 fathoms water, Morro Viado bearing South, and the lighthouse of Sta. Anna on the horizon, West.

San Jose' Bay.—To the West of Sta. Anna Island the coast runs to the S.W., forming the bay of San José which is limited on the West by Maranham Island. All this bay is filled up with sand banks, which generally lie in a N.W. and S.E. direction, caused by the direction of the currents. These banks extend 5 miles northward of the parallel of Sta. Anna lighthouse. Their outer limit is called the *Coroa Grande*, the greater part of which breaks, being very steep-to, and generally out of sight of land. Should you find your vessel in among these banks, the best way out is to steer to the N.E., which is the general direction of the channels between them. The best of these channels lies just to the westward of Sta. Anna Island; the currents through them are very rapid. The Coroa Grande has its N.E. extremity in lat. 2° 11′ 30″ S., long. 43° 51′ 38″ W., and its West extremity 10 miles North of the East extremity of Maranham Island.

Three Brothers Shoal.—This shoal, long since considered as not existing, was again reported in 1868. In November, 1868, the ship *Three Brothers*, having lost sight of Sta. Anna light 15 miles to the S.E., and running for Maranham with a fresh breeze, passed nearly an hour on a shoal, which they considered to be in lat. 2° 7′ S., long. 43° 48′ 38″ W., 18 miles N.E. from the N.E. point of Maranham Island, thus lying in the route most used by vessels, and most recommended by the best pilots. If the ship *Three Brothers* did not pass over the outer part of the Coroa Grande, this must be a bank which only shows itself by breakers in very rough weather, as its position is so often passed near. Its existence may be considered *doubtful.*

From Ceara to Maranham, by Captain Hewett, R.N.

"From Ceara the coast trends N.W. by W., 35 leagues, to *Point Tapaji*, and thence West, 10 leagues, to *Jericoacoara*, the depth gradually increasing off-shore; but a N.W. course should be pursued, in order to avoid the shoal parts of the *Bank of Caracu*. Having run 100 miles upon the N.W. course, allowing 1½ mile per hour for the current's assistance, in soundings varying from 11 to 20 fathoms, change the course to W. ½ N., which is nearly the direction of the coast from Jericoacoara to Maugues Point; and it will give you a sight of the land as far as the Island of Sta. Anna.

"When ships are bound to Maranham, from seaward, it is absolutely necessary to make the land considerably to the eastward, as the currents in general set very strongly between W. ½ S. and W.N.W. If, in endeavouring to make the land, you should be in latitude about 3° S., on discovering it, you will be off Mount Melançia, or between it and Ceara; if the latter, three other mountains will be observed to S.S.E., lying nearly S.E. and N.W. of each other, which mountains are about 7 leagues to the westward of Ceara, and are easily seen from that place. About this part of the coast you will have a bottom of fine sand and shells.

"If you should make land when you consider yourself in from lat. 2° 15′ S. to 2° 30′ S., and have a bottom of small red and white stones, you will be off Jericoacoara. If the bottom consists of yellow, blue, and red stones, you will be off the *Paranahiba* or *Tamonia*, and three mountains, lying nearly in the meridian of each other, in the neighbourhood of the latter, will be seen.

"The whole coast from Point Macoripe to Paranahiba is sandy to about half a league inland, whence it appears well cultivated; so that it is easily distinguishable from the coast between Paranahiba and Green Mangues (Mangroves) Point, which consists of nothing but sand, without the least sign of vegetation.

"Inclining to the shore, and observing the *Lançoes* or sand-hills well, as you pass along, the entrance of the River Perguiças will easily be distinguished. The sand will now begin to assume a higher and more irregular appearance; this height and irregularity does not, however, deserve the appellation of hills. When the Perguiças bears S.S.E., you will begin to shoalen your water to 8 or 9 fathoms, but a steady course should be pursued, as you will presently pass a spit formed by the sand washed from the river, and which, meeting the natural course of the current in the offing, inclines it to N.W.

"If the day should be far advanced, when you are off this part of the coast, haul to the wind under topsails and foresails for the night, standing off into 22 or 24 fathoms, and on into 12 or 14 fathoms. It would be advisable to haul the wind before you are past the Perguiças, as otherwise you may be short of daylight for the operations of the ensuing day. At daylight you may bear up under all sail, pursuing the former course and distance from the shore, and toward the conclusion of the sand-banks (Lançoes) the land will begin to appear a little more fertile, and Green Mangues Point will easily be distinguished.

"When you lose sight of the Island of Sta. Anna, bearing about S.S.E., you will be abreast of the Great Crown Bank (*Coroa Grande*), and should keep a good look-out to the southward from the mast-head; and if breakers should be discovered, or if you shoalen your water to less than 18 fathoms, haul out half a point, but no more. Your distance to be run on a N.W. by W. course will be about 13 miles, and on the westerly course 11 miles, including 1 mile per hour upon each for the assistance of the current, before you alter the course to W.S.W., which having done, without fear, look out for Mount Itacolumi ahead, and the *Tapitapera* coast on the port bow." This mountain, with its lighthouse and coast, are described hereafter.

M. Roussin says that the breakers of the Coroa Grande, with those of the Isle of Sta. Anna, may sometimes in clear weather be seen from the mast-head at 9 miles off, and from the deck of a small vessel, at half this distance. They are divided into several groups, and always show, although the tide rises 12 ft. The only difference in their appearance is produced by the state of the tide, or the greater or less elevation of the waves.

On approaching the Coroa Grande from the North, when the sky is not clear, you may distinguish the coast of Maranham Island from that of Sta. Anna by its being higher, wooded, the configuration varied, and a bald white shore on the North.

MARANHAM.—DESCRIPTION, &c.—The *Bay of San Marcos*, *Maranhao*, or *Maranham*, is comprised between the Island of Maranham and the continental coast on the West. Its principal entrance lies N.N.E. and S.S.W. The bay is navigable, in the greater part of its extent, for large vessels ; and vessels may anchor before the *Harbour of St. Luiz*, the principal part of the bay, situate on the coast of Maranham Island.

The entrance of the bay, being limited on each side by dangerous shoals, must be approached with caution. It was surveyed, with the coast to the eastward, in 1866-7, by Capt. Mouchez, of the French navy.

SHOALS in Maranham Bay.—At 5 miles westward of the West point of Coroa Grande the *Bank do Meio* commences, which thence extends S.W. 8 miles, with an average width of half a mile. Its least depth is 2 fathoms at low water, 10 miles N.E. by N. ½ N. from the light of San Marcos; the general depth over it is 3 to 4 fathoms. To the eastward of the Bank do Meio lie many small banks between it and the West side of the Coroa Grande. There is, however, a navigable channel just to the East of the Bank do Meio.

Between this bank and Alcantara you find the depth 18 to 22 fathoms, this being the entrance through which vessels pass up to Maranham. The South extremity of the Bank do Meio lies E. by S. ½ S. from a remarkable red spot in the cliffs at Pirarema Point.

San Marcos Bank, of sand and coral, commences at 1 mile N.E. from the San Marcos light. It is 2½ miles long, E.N.E. and W.S.W., and three-quarters of a mile wide. There is a 2-fathoms channel between it and the coast. A small detached shoal, named the Baixo de Parola, lies 1 mile from its eastern end.

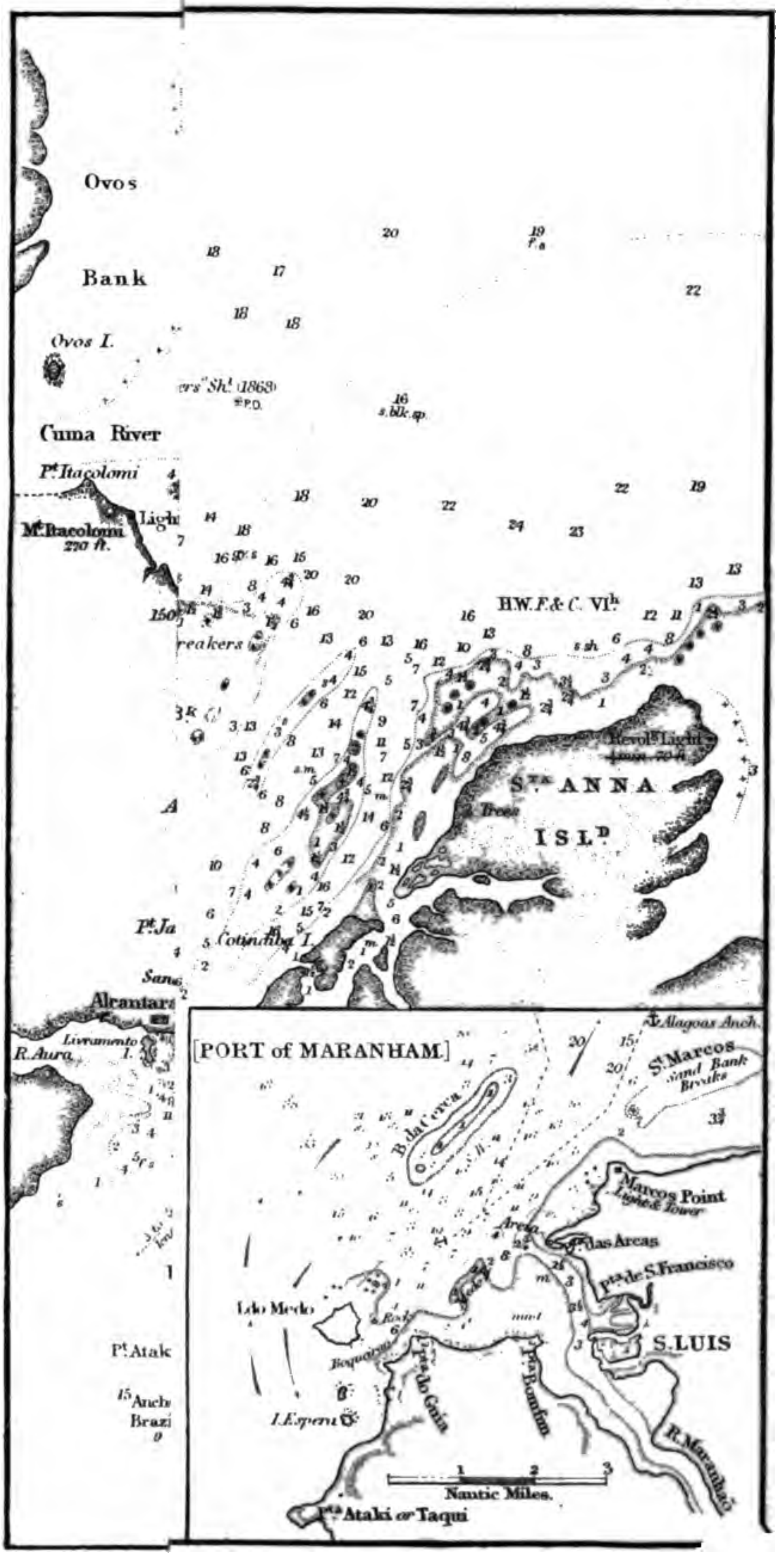
Cerca Bank, lying off the entrance to the Port of Maranham, is 3 miles long, N.E. and S.W., and nearly half a mile broad. It breaks throughout its length, as little as 3 ft. of water being found on it at low water. Its S.W. point lies 3 miles W. ½ N. from Point San Marcos. The currents run very strong over this bank, and vessels often lose their anchors on it.

Coroa das Almas, Peixada Bank.—This bank, lying 5 miles N.W. from the Meio Bank, and 6 or 7 miles from the coast of Alcantara, forms the West side of the channel. Only its southern part is dangerous, where there is but 3 ft. of water. This is cleared by not shutting in Point Tatinga with Point Raymondo. These two points in line, about S.W., lead just outside the danger.

Throughout all the rest of the Peixada Bank, which is 9 miles long, N.N.E. and S.S.W., the depths vary between 3½ and 5 fathoms. The North extremity of the bank lies 12 miles E. ¼ N. of Itacolomi light, and 10½ miles N.W. ½ W. from the N.W. breakers of the Coroa Grande. Between this bank and the coast is a channel of 10 or 11 fathoms, not much used.

Itacolomi Bank, and the Coroa dos Ovos.—These two banks, on which there are many shoal spots, situated between the bearings East and N. by W. from the Itacolomi lighthouse, are joined up to the coast, but, being well without the usual track of vessels, are little dangerous. The Coroa dos Ovos forms a line of breakers, running parallel with the coast, at 5 or 6 miles from it. The Itacolomi Bank projects for 8 miles N.E. by E- from the lighthouse, into 4 fathoms water.

COASTS of Maranham Bay.—All the coasts of this bay are less than 150 or 200 ft. in height, and visible at about 17 miles off. It presents every form of cliff, crowned with vegetation. The outline is very regular, and it is only by the marks on the cliffs, and the little elevations, that you can tell your position.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[PORT of MARANHAM]
Alagoas Anch.
St Marcos
Sand Bank
Breaks
B. da Cerca
Marcos Point
Light & Tower
Areia
Pt das Areas
Pta de S. Francisco
S. LUIS
I. do Medo
Boqueirão
Pta do Gaia
Pta Bomfim
I. Esperu
R. Maranhão
Nautic Miles
Pta Ataki or Taqui

In coming from the N.E., and approaching the West part of the Coroa Grande, the first part of the Island of Maranham, which you will see is the line of trees crowning the *Morro Aracaji*, 215 ft. high, which lies 9 miles E. by N. of San Marcos light. This, the highest land of all the bay, is visible at 19 miles. Shortly after sighting this land you will be very close up to the banks, and then will appear a second clump of trees to the East of the Morro Aracaji and the two white downs forming the N.E. point of the island.

The *Morro Alto* is the first land seen on the West side of Maranham; it is 1½ mile to the East of San Marcos, 180 ft. high, and visible 17 miles off. It appears as if vertically striped with white.

San Marcos Point, and Light.—The lighthouse of San Marcos is placed on the summit of the cliff, which terminates the island of Maranham to the West. It stands on an old fort, and shows a *fixed bright* light, elevated 130 ft., and visible 10 miles. San Marcos Point is surrounded by a reef, which extends 2 or 3 cables off it.

To the southward of San Marcos Point the coast is formed by a low tongue of sand, 1½ mile long, which extends in a S.W. direction, and forms *Point Areia*, at the northern side of the entrance to the port of Maranham; on it is the small fort of San Antonio. A sand-bank extends about 7 cables off shore along this piece of coast, and vessels should keep about 1 mile off to avoid it.

Opposite Areia Point the South side of the channel is formed of sand-banks. This channel runs in a W.N.W. and E.S.E. direction. A lantern is shown behind the South angle of San Antonio Fort, and in such a position that it is only visible when bearing E.S.E., thus forming a leading light into the channel. You may pass close to Areia Point, as the shore is nearly steep-to. For a steamer, the entrance is very easy by night or day. More full directions for entering will be given presently.

ST. LUIZ.—The city of St. Luiz, the capital of the province of Maranham, and the seat of government, is built on a tongue of land between two rivers, and occupies two small hills, situate at a short distance East and West from each other, and separated by a little valley. Several buildings are remarkable for their size, particularly the public edifices, of which the principal is the cathedral, occupying the North side of a square covered with grass, and lying before the palace of government. The streets are generally at right angles, but the inequality of the ground renders a walk fatiguing, the roads being steep. It has a good hospital for merchant seamen, supported by a charge on shipping. The population of the town in 1866 was about 30,000, of which 20 were English, 36 French, and 3,000 Portuguese. The population of the province in 1875 amounted to 359,040. In 1865, 104 vessels, of 25,846 total tonnage, visited the port, of which 42 vessels, or 11,809 tons, were British. The principal exports are coffee, wool, cotton, rice, sugar, and hides, &c. Importations from England principally consist of iron, steel, and coal. This is the only port in the province having a custom-house, and where foreign vessels can trade. Steamers ply between Maranham and the towns on the rivers in the interior.

With regard to the winds and other phenomena, the year may be here divided into two seasons; winter, which begins in December and ends in May; and summer, which prevails during the other six months. The first of these two seasons is that of the rains, which fall abundantly, with the wind generally between East and North, and are accompanied by violent storms, especially in the months of February, March, April, and part of June. The thunder and lightning are then almost permanent, and in the squalls the wind blows from the North to the S.W. by S. Nevertheless, they do not experience at Maranham *hurricanes*, properly so called; and, even in the worst times, there are long intervals of tolerable weather. There are frequent falls of rain in the summer; and, in this season, the regular winds are mostly from E.S.E. to N.E. by the East, these being the *general winds*.

The air at Maranham is generally healthy, but in the season of the rains fevers of a dangerous nature at times prevail, though they commonly yield to appropriate treatment.

Water can be procured alongside at from 6*s*. to 8*s*. a ton; provisions and cattle may be procured, but are generally very dear; coal is to be obtained. Vessels can be repaired, and can also heave down. *Pilots* will board vessels making the usual signals, generally inside the Meio Bank.

To the South of Medo Island is one of the best anchorages in Maranham Bay; here the currents are less strong, and the sea less agitated by the wind, than at the other anchorages in the bay. Large vessels, whose draught of water will not allow them to pass up to the town, usually anchor here, as do often those which come here for repairs.

The Coast of Alcantara, forming the West side of Maranham Bay, is comprised between Point Itacolomi and the River Aura, near to the town of Alcantara. The coast is formed of reddish cliffs, about 150 ft. high, backed in many places by sand-hills.

Alcantara.—The small town of Alcantara is situated at the South extremity of the coast we have just described, at the northern side of the entrance to the River Aura. You will distinguish the steeples of the town when approaching San Marcos Point.

There is a good anchorage in front of the town, large vessels being able to anchor at 1½ or 2 miles from it in 10 or 11 fathoms, with Point Tatinga bearing N. by E., and the South point of Livramento Island W. ½ N. Small vessels anchor in 2 to 3 fathoms, a mile to the N.W., having a small 1-fathom bank half a mile South of them. Alcantara is only visited by a few coasters, which come here for cotton. A *small light* is said to be shown on the shore South of the town.

Point Tatinga, 2 miles East of Alcantara, is one of the best marked points on this coast, as it is surmounted by a hillock, and there is also a conspicuous white down at half a mile North of it, midway between it and *Port Raymondo*, which is high, and has red cliffs. At 3 miles N.N.E. of Point Raymondo is *Point Pirarema*, also having red cliffs. To the South of this point is a very remarkable red spot in the cliffs, which is hidden by Point Pirarema to the northward. From this spot the South end of the Bank do Meio bears E. by S. ½ S.

Morro Alegre, 2 miles N. by W. of Point Pirarema, shows only a little above the cliffs, but it is remarkable as the highest land on this coast, which is formed of downs and cliffs alternately, gradually diminishing in height to Itacolomi Point. *Point Pirajuba* and *Point Canavieiras* are not recognizable, except when bearing N.W.

ITACOLOMI POINT, and LIGHTHOUSE.—The lighthouse is a quadrangular building, 75 ft. high, on the cliff of Mount Itacolomi, the sides of which face the cardinal points. It shows a *revolving* light, *red* and *bright* alternately, elevated 147 ft. and visible 15 miles. Each flash lasts 50 seconds, and there is an eclipse of 50 seconds between each flash.

On approaching Mount Itacolomi, it appears in the shape of a gunner's quoin, and is remarkable only from the low land in the vicinity. From the lighthouse on Sta. Anna Island it bears W. by N. about 50 miles.

Morro Itacolomi, 270 ft. high, situated at 1 mile W.N.W. from the lighthouse, is the most easily recognised point of this coast, as it is far the highest land in the vicinity, and is first seen at 20 miles off. In coming from the eastward, when this mount comes in sight, you will know that you are to the West of the Coroa Grande, and may steer to pass to the West of the Bank do Meio.

GENERAL DIRECTIONS FOR MARANHAM, BY CAPTAIN MOUCHEZ.

Making the land about Maranham has been justly considered one of the most difficult spots on the coast of Brasil, and the frequent shipwrecks which have taken place without the entrance of the port fully justifies this opinion. These have been caused in a great measure by the want of reliable charts and directions.

The tides are very strong, and these, combined with the general current to the W.N.W., occasion many variations from the right track, at the very time when it is most necessary to know the position of the vessel with accuracy. Our surveys in the *Lamotte Piquet* have, I hope, dispelled a great part of the difficulties of this landfall, by fixing with accuracy the limits of all dangers, and drawing up reliable charts, in which may be clearly seen the best route to follow.

Nearly all directions recommend making the land on the coast of the Lançoes, where there is a stretch of 10 leagues of white sand downs, a sight of which will show with certainty your position. If uncertain of your longitude I think this is prudent, as the winds and currents will carry you towards the West; but knowing your longitude within 8 or 10 miles, it is much preferable to make for the N.E. point of Sta. Anna Island.

If you are obliged to make the land at the Lançoes, do so only during the day, and change your course to W.N.W. immediately you see the land from the bridge of the ship, in order to avoid the banks lying off shore for 6 or 7 miles, the land being only visible, in clear weather, 14 or 15 miles. Nearly all the enquiries by consuls into the causes of shipwreck, show them to have occurred from vessels approaching the shore after having sighted land, or approaching it when obscured by fog or rain.

The banks are very steep-to, the depths changing suddenly from 11 to 2 or 2½ fathoms, so that sounding is of very little use unless made regularly, and in certain cases give a false confidence, which tends to bring about an accident.

Having determined to make this low shore bordered with banks, you should not do so except with great caution, and only with a clear atmosphere, when the land is to be seen at 12 or 15 miles. At night, approach no nearer than in 16 or 18 fathoms, which indicates the limits of the visibility of the coast.

Tides.—The tides at Maranham are regular, and, being very strong, it is indispensable to calculate the exact time for the day on which you make the land, in order to allow for the effect of the stream on your course.

The flood tide runs to the S.W. in the direction of the general trend of the banks, the ebb to N.E.; the rate is 2 or 3 knots near these banks, and 1½ to 2 knots a few miles without. The course of a vessel will be much altered by these streams, and you should be continually noting your position.

It is high water, full and change, without Santa Anna Island at $6^h\ 10^m$; the water rises 13 ft. on the exterior banks. In the port of Maranham ebb commences half an hour earlier than it does at Sta. Anna. At San Luiz de Maranhao it is high water, full and change, at $6^h\ 59^m$; the rise 18 ft. 6 inches at spring tides, and from 9 ft. 10 inches to 11 ft. 6 inches at neaps.

From the Lançoes to Maranham.—Having sighted the Lançoes you proceed in a N.W. by W. ½ W. direction, keeping 3 or 4 miles without the dangerous Cruz Bank. You will see in succession the Morro Alegres, Morro Viado, and the wooded point of Mangues Verdes, which ends the white sandhills. Keeping in 14 or 16 fathoms, you will find more mud mixed with the sand and gravel when to the West of Mangues Verdes, than to the East of that point. The water is generally muddy at the entrance, and this might mislead, as it has the appearance of being of little depth. This muddy water is found sometimes to extend a long way into the sea.

To the West of the Morro Viado commences the dangerous reef of Santa Anna, of which the outermost part is named Cesar Bank, before described. This bank, which will be known by its breakers, you leave 3 or 4 miles to the South. But they may be approached closer if more convenient, being very steep-to. Having made out the island of Sta. Anna, continue W. ½ N. or N.W. by W. ½ W., according to the tide.

If you make the land at this island from the N.E. you should keep well off to the northward, as hereafter described. By night the light is visible 13 or 14 miles, and disappears when brought to bear East of S.S.E. When on the meridian of Sta. Anna Island, at 2 or 3 leagues to the North, steer to the N.W., until you lose sight of the land to the S.E., in order to clear the dangerous Coroa Grande. Having lost sight of Sta. Anna Island, 18 miles to the S.E., steer W.S.W. if ebb, and W.N.W. if flood tide; and having run 15 miles in this direction, you will come in sight of Morro Itacolomi, which first appears as an island; you now steer to the S.W. to enter the channel, when you will come in sight of the Alcantara coast, with its red cliffs and the Morro Alegre before described. You will also see the Morro Alto, near Maranham, which, kept bearing S. by W. or S. by W. ½ W., will lead through the best part of the channel. As before stated, the points Tatinga and Raymondo in line lead just clear of the dangerous Coroa das Almas, lying off Itacolomi. In approaching Itacolomi at night, 13 or 14 fathoms will be found when the light should be seen. If from any cause the light should not be seen, and the depths decrease to 10 or 9 fathoms, you are approaching the

Bank Do Meio or Itacolomi, and it would be prudent to anchor and wait for daylight.

There is no need to allow for the tide in proceeding to the S.W., as its only effect is to increase or retard the speed of the vessel. If, on arriving off Sta. Anna Island at night, you wish to wait for daylight, keep the light bearing between S.S.E. and S.S.W.

Pilots do not board until you are within 2 or 3 miles of San Marcos Point, and from thence conduct you into the port. The pilotage service is not well conducted, and causes many complaints. A lightvessel and pilot station near the S.E. point of the Coroa Grande, would add much to the safety of this port.

Anchorages.—Not wishing or not being able to enter the Port of San Luiz de Maranhao, you have a choice of three anchorages, the first of which is that of Alagoas, 1½ or 2 miles N.E. of the light of San Marcos, in depths of 10 or 12 fathoms, fine sand; here the sea is often rough during fresh breezes from the East or N.E. Besides its inconvenience in being so far from the port, the tides do not help you to gain the entrance. The second anchorage is between the entrance of the port and the Bank da Cerca. This is the nearest anchorage to the port, but it has the inconvenience of strong currents, and the risk of losing anchors on the patches of rocks which lie in different part. The bottom is sand and madrepores, overlying a bed of rock. The third anchorage is that previously mentioned, lying to the South of Point Itaqui and Medo Island. Here is perfect shelter at all times, and the currents are not strong. The only inconvenience is its being 6 or 7 miles from the town.

Those vessels whose draught will not allow them to enter the harbour of St. Luiz, and which may require some repair, may find a tranquil anchorage in the little bay or cove of *Ataki*, to the S.W. of Maranham, having a bottom of mud or oaze, with 15 or 16 fathoms of water; the current less rapid than before St. Luiz, and the sea always smooth. After doubling the Island Medo on the West, the distance to it is between 1 and 2 miles.

In anchoring care is at all times required, in order to avoid damage to chains or anchors, either by casting anchor on the rocky patches or on the beds of tenacious clay, which latter, by stopping the vessel too suddenly in the strong current, will cause a strain on the cable.

Directions for entering the Port.—Approach from the North with the light of San Marcos bearing S. ½ W. or S. by W., and round the point at 1 or 1½ mile distance, in order to avoid the shoals which surround it. Care must also be taken to avoid the Cerca Bank, which does not always break. From abreast San Marcos Point, steer S.W. ½ W. or S.W. ½ S., parallel with the shore, avoiding the shoal water which lies off it.

The entrance to the port is narrow, and runs in an E.S.E. and W.N.W. direction. There is a depth over the shallowest part of the bar of 13½ ft. at low water and 30 ft. at high water. At low water the edge of the dry banks on either side indicates the limits of the channel, the banks being very steep-to; but at high water, when these banks are covered, you must enter with the fort on Point Areia bearing E.S.E., steering more to one bank or the other, according to the direction of the current, N.E. or S.W. Sailing vessels always find a difficulty in entering, as the wind is seldom favourable; steamers find an easy entrance, and could do without the assistance of a pilot, if it were not compulsory to take one. You may pass within a cable's length of Point Areia. As before stated, a light is shown at Point Areia, only in the direction of the entrance of the channel. Merchant vessels, waiting for the visit of the local authorities, and war vessels, anchor half a mile within Point Areia, near the red cliffs of Point San Francisco. They should anchor as near the cliffs as possible, in order not to be in the way of vessels passing in and out. The commercial port is within a few cables of the town. There is always less than 4 or 4½ fathoms depth in these different anchorages.

Leaving Maranham.—To leave Maranham, you should have everything in readiness to raise the anchor directly the flood tide has finished, and the ship has swung round with the ebb, in order to have full advantage of the ebb flowing to the N.E., as it is often possible to get well without the Coroa das Almas in one tide, by taking every advantage of the ebb running to the N.E. The first tack in general clears the North end of the Cerca Bank; after this the channel lies between the coast of Alcantara, which may be approached within 1½ mile, and the Meio Bank. Having arrived abreast the Coroa das Almas, the tack to the West is much shortened; and to avoid this bank, as before stated, you must keep Point Tatinga open of Point Raymondo.

It is no advantage to go out by the passage East of the Bank do Meio, which is narrower, and has not the advantage of so strong a current as the passage West of it. In general, in the Bays of Maranham and San José, the strength of the current increases with the depth. The depth East of the Bank do Meio is 8 to 11 fathoms, 20 to 22 fathoms being found West of it, where the current sometimes runs 4 knots.

At 6 to 9 miles East of Itacolomi the pilot will leave you with nothing to fear but the Manoel Luiz Reef, hereafter described. If bound to the East, you must pay great attention to the direction of the tides, which run N.E. by E. and S.W. by W., and much stronger near the shore than farther off. For this reason it is better to keep nearer the shore during the ebb than during the flood tide.

Captain L. Tardy de Montravel says:—Supposing a large ship wishes to leave the Bay of San Marcos, and she is moored before the entrance of the port with the wind from between E.N.E. and E.S.E., she will get under weigh at high water, and steer W.N.W., to pass to the South of the Bank da Cerca, which will be passed when the little islet to the N.E. of the Isle do Medo lies to the East of the easternmost of the two Espera Isles. The lead will be a sufficient guide. Then bear up as close as possible to the wind, and run on until you are about 2 miles from the shore of the continent.

So long as you are to the South of the white patch of Pirarema bearing W. ½ N., you may tack from one side of the bay to the other without fear of the Bank do Meio; but, when to the North of this bearing, you must keep within the following limits:—To avoid the Bank do Meio, you must, while to the South of the high lands of Point Pirarema, keep to the West of the bearing of Fort San Marcos S.W. by S. ½ S., and when you have passed to the North of the parallel of the same high lands of Pirarema, you must keep to the West of the bearing of the Point Tatinga S.W. by W. The Coroa das Almas and the Bank of Pirajuba are cleared by keeping eastward of the line of Point Tatinga on with Point Raymondo, bearing S.W. ¾ S. These banks being too steep for the lead to give any indication on approaching them, it will be prudent to keep within the above bearings.

Leaving the port at high water thus, a vessel, though of large draught, can keep on the port tack without fearing the Bank da Cerca, on which there will be a depth of 20 ft. at high water. A small vessel also, at any hour of the tide, need take no notice of the Bank do Meio, as there is never less than 12 ft. on it at low water; and from thence you may tack from one side of the bay to the other, that is to say, from the Banks of Coroa Grande to those of the Almas; but as the ebb will be stronger on the western side of the bay, it will be better to tack in that part of it. It is for this latter reason that the pilots prefer the western passage for large ships on leaving to the eastern passage, in which, nevertheless, the lead is a better guide than the first.

I would advise a vessel which, leaving too late, or hindered by any cause, cannot get out in a single tide, to take the eastern channel in preference, in order to choose an anchorage at the end of the ebb tide. The sea there is quieter, and the bottom better than in the western channel.

A vessel which has but a short time to stay in the Bay of San Marcos will do well to stop at the anchorage called, by those who frequent the bay, the *Road das Alagoas*, to the N.E. of Fort San Marcos; there will be found an excellent bottom in 10 and 11 fathoms water, and the sea quiet.

A vessel brought to the parallel of the Morro Itacolomi is considered as being out of the bay, and is then left by the pilot.

SHOAL OF MANOEL LUIZ.—This dangerous shoal, which lies in the direction of N. by E., 77 miles from Itacolomi lighthouse, was first explored by M. Roussin, who ascertained its position in 1820. It was previously known only by the number of wrecks which it had occasioned, and M. Roussin found it to consist of several groups of conical rocks even with the water, and separated by intervals unequal both in distance and in depth. Situate in a sea rarely exposed to violent winds, this reef breaks only at short intervals and at low water. It is therefore almost impossible to see it, unless when passing very near. Nevertheless, several rocks of the flat have over them not more than from 5 to 15 ft. of water, with 8, 10, and 12 fathoms at their base.

The breakers, which rise instantaneously, have the appearance of the spouting of a whale, while the sea is smooth about them; and, when they cease, they leave masses of white foam, which continue for some time. When the sky is serene, the rocks may be seen under water, appearing like great black patches; but these are not visible until too near to be prudent for a vessel to advance to them. After two hours' flood, and only at half a mile off, with the sea smooth, no trace of them will be seen.

M. Roussin examined the shoal on the East, the South, and the West; and he pronounces that there can be no other danger hereabout in these directions; but circumstances did not allow him to complete an examination from the North.

M. Roussin's observations, at 400 fathoms to the South of the westernmost rocks, gave for the lat. 0° 51′ 25″ S., long. 44° 14′ 35″ W. (corrected long. 44° 16′ 56″).

The reef, which lies [illegible] East of Maranham, is more than half a mile across from North to South, and about 2 miles long in an E. by S. and W. by N. direction. Should a vessel strike upon it she would, most probably, go down immediately, as was the case with the [illegible], of Liverpool, which ship unhappily experienced this misfortune and disappeared in about twelve minutes. The utmost precaution, therefore, is necessary in order to avoid this danger.

By anchoring for thirty hours near the edge of the shoal, it was found that the tide set regularly six hours each way, the flood to the S.W., and the ebb to the N.E., nearly with the same strength, six-tenths of a mile per hour. High water, on full and change, at 7h. The rise and fall was 12 ft. These remarks have been confirmed by others made by Lieutenant Lartigue, in a vessel called the [illegible], who found the alternate streams to run at times to be of nearly a mile in the hour.

The shoal of Manoel Luiz was again examined on the 9th of December, 1828, by Captain George Cheesley, during a fine steady breeze, nearly East, and clear weather. This gentleman has said:—The appearance of the reef, on approaching, is only that of a heavy sea, or rollers, hardly breaking in calm weather, and consequently the more dangerous. It is very steep, rugged, and composed chiefly of detached coral rocks. The shoalest part appears to have about 8 ft. of water over it, the sea breaking as it were, through gaps or little channels under water. The extent seemed to be about 1½ mile from East to West, and from half to three-quarters of a mile North and South. Lat. 0° 52' 10" S., long. by chronometer (Jackson, of Liverpool), 44° 12' 17"; by another (Hornby, of Liverpool), 44° 12' 40"; mean, 44° 12' 6". The accordance of these results with those of M. Roussin leaves us in no doubt as to the situation of the shoal.

There is perhaps another shoal to add to the previous, lying 30 miles N.W. by N. from the vigia, of which the position is given in the journal of Captain Le Hidry, of the brig *Les Jumeaux*, as follows:—I had left Maranham on October 3rd, 1828, at 2 a.m., to proceed to Guadaloupe; the 1st of November, at 7h 30m, the wind at East, slight breeze, fine weather, I perceived ahead a remarkable change in the water, which had become whitish or greenish, with a very short sea, which seemed to rise and break in the direction of our track, which was then N. by W. We were surrounded by these rollers, and large patches under the water made me think that I was over some shoal, and gave me some inquietude as to our position. At 9h I sounded in 17 fathoms water, rocky bottom, continuing our route in the same direction, and under the same circumstances, the ship going 2 knots. I sounded at 9h in 19 fathoms, bottom of coral; at 10h I found similar bottom with 21 fathoms; at 11h I had 26 fathoms, same bottom; at 20 minutes after noon observed the latitude, the depth was 29 fathoms; at 1h I sounded without finding bottom at 85 fathoms, the sea had become quiet, and had attained its natural colour.

A good meridian altitude at noon gave lat. 0° 4' N. The longitude by a good chronometer was 44° 44'. It results from these observations that the shoal I had passed extends from lat. 0° 9' S. to 0° 4' N. in a S. by E. and N. by W. direction. From my observations in this part the sea is much agitated, and breaks at intervals in the direction of N.W. and S.E. I think that it may be a part of the vigia of Manoel Luiz, and the breakers seen by

Da Sylva. Without being able to assert that it may be shoal enough for a vessel to ground on in parts, I think that it is dangerous to cross it in bad weather, on account of the heavy sea which you may meet with.*

In 1872 a shoal was discovered by Captain Hutchinson in the middle of the channel between Manoel Luiz Bank and San Joao Islands, in lat. 1° 4′ S., long. 44° 32′ W. It has but 5 fathoms water on it, and is very steep on its N.W. side, having 22 fathoms close to it.

This shoal is in the usual track of vessels bound from Maranham to the northward.

MARANHAM TO PARA′.

PARA′, or **GRAND PARA′**, is the northernmost province of Brasil, and is celebrated for its cotton, sugar, india-rubber, vanilla, chocolate, and coffee. The climate here is very sultry; the woods abound with valuable timber, of great solidity and beauty, and trees that yield odorous balsams.

The land is, almost without exception, of the most fertile description, and particularly so in the neighbourhood of the rivers and on their numerous islands, where the soil consists of successive alluvial deposits from 4 to 8 ft. deep. The population, in 1875, amounted to 275,237.

The voyage from Maranham to Para′ was formerly performed by canoes coasting round not less than thirty-two bays, some of them so broad, that the opposite land is frequently invisible. At present the voyage is performed in a steamboat in from two to three days. The coast is uniformly low, and much intersected with bays and lagoons. The southern mouth of the Amazons is usually called the Para′ River. The entrance is intricate, and by no means safe, as there are no permanent landmarks; it lies between the two dangerous shoals of Tigioca and Braganza. Vessels have been frequently wrecked on these, and the crews have sometimes all perished. In descending the river there is little danger. If the weather is clear, the breakers on the Tigioca and Braganza Banks are seen as the tide flows upwards; after entering this mouth of the Amazons the conflict of the ascending and descending waters is called by its aboriginal name, *pororoca*, and characterises the navigation for some hundreds of miles. No sailing vessel can descend the river while the tide is rushing up from the ocean; and both in ascending and descending distances are measured and regulated by tides. Para′ is said to be three tides from the ocean, and a vessel entering with the flood must anchor during two ebb tides before reaching the city. Canoes and small vessels, to avoid any danger from the *pororoca*, generally lay-to in certain places called *esperas*, or resting-places, where the water is little agitated. Most of the vessels used in the Amazons are constructed with reference to its tidal navigation; that is, for floating with the stream rather than for sailing before the wind, although sails may often be serviceable.

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* *Vigia of M. Da Sylva.*—M. Roussin says that, in 1825, he was apprised of the existence of a group of rocks, said to have been discovered by M. Da Sylva, an officer of the Brasilian Marine, and he enters largely into the question whether they may not be those of Manoel Luiz. The position assigned to the Vigia of M. Da Sylva is 0° 32′ S., and 44° 17′ W., and it consequently lies, according to this account, 21 miles to the northward of that of Manoel Luiz.

The regular ebb and flow of the tides in the Amazons is observed as far as the confluence of the Madeira, 600 miles above the mouth. The *pororoca* is much more turbulent on the northern side of the Island of Marajo, where the mouth is broader and the current more shallow.

In the following description of the coasts between Maranham and Para', we have availed ourselves of the work of M. Tardy de Montravel, of the French Marine, the surveyor of this portion of the Brasilian coast, to which we have alluded, and also to that of M. Ch. Ph. de Kerhallet. From these observations and surveys we have also corrected our charts, by referring to which these directions will be better understood.

Cuma Bay.—From Itacolomi Point the coast turns suddenly to the West, and forms the large Bay of Cuma, at the bottom of which is the town of Guimaraes. This bay, encumbered with shoals, has at its mouth a small island, called *Ilha dos Ovos* or *Taruoca*, and offers, I have been assured, good anchorage; but the channel leading to it is shallow, and of difficult navigation. Several rivers, of which the principal is the *Guimarens*, discharge themselves into the bay, and cause, throughout its extent, a strong tidal current; the flood running W.S.W., and the ebb E.N.E., influenced by the East and West direction of the bay.

On the coast to the North of the Bay of Cuma the land is low and wooded, but a little inland there is a striking elevation in lat. 2° 1′ 15″ S., long. 44° 28′ 38″ W., and 10 miles N.N.W. from the Morro Itacolomi. This will be useful to vessels which have got too far West in entering the Bay of Maranham, to find their position by.

At 3 miles N. ¾ W. from the Isle dos Atins, at the entrance of Cuma Bay, is that of *Tucunanduba*, forming, with *Tru Island*, which immediately follows it, the *Bay of Tucunanduba*. After Tru Island comes *Point Caouca*, where the coast, running to the West, forms the *Bay of Cabello da Velha*, at the North point of which is the *Isle Mangas*. This bay is deep, and receives, like that of Cuma, many streams; it affords anchorage to small vessels, by a channel on the North side; but, like all those on this continent, it is of difficult navigation.

Ambrose Shoal.—It was announced in 1870 that the *Ambrose*, steam-vessel, discovered a shoal, by striking on it, at 10 miles northward of the entrance of Cabello da Velha Bay, in lat. 1° 33′ S., long. 44° 37′ W., which places it at 5 miles to the N.E. of Mangas Isle. It is reported to extend 2 or 3 miles in an E.S.E. and W.N.W. direction, with depths of 3 to 6 fathoms over it.

Between the Isle Mangas and *Point Tury* you meet with the islands of *Joaosinho*, *Cajirutiva*, and *Carapatitiva*; then comes the *Bay of Turyrana*, bounded on the North by the groups of the Isles of San Joao, which separate it from that of Turyassu. The former is encumbered with shoals, and is considered as closed to navigation for vessels of any size.

ISLES OF SAN JOAO.—These islands are low, like the islands and coast which precede them. They have, on their N.E. side, some sandy downs, by means of which you cannot fail of recognizing them. The easternmost of the group is detached, 70 ft. high, and has not any vegetation up to its summit which is rather high compared with the neighbouring lands. The white sand, of which it is entirely composed, has given to it the name of *Lançoes*. To the E.N.E. of the group of San Joao a sand-bank runs out nearly 8½ miles, on which the sea breaks, and towards the North there is a flat of yellow sand, of very rapid declivity towards the N.W., but gradual and regular to the N.E.

At 45 miles N.E. by E. ½ E. from these islands is the Bank of Manoel Luiz; the channel between has been sounded partly by Admiral Roussin and partly by M. Lartigue and M. de Montravel. In 1872, a shoal of 5 fathoms, previously described, was discovered in this channel. Now that the position of Manoel Luiz shoal has been exactly determined, vessels leaving Maranham frequent it with perfect security. The breadth of the channel, the close vicinity of the point of departure which can be taken, the passage of yellow sand which the lead shows upon the bank of madrepores, mixed with gray sand, and the progressive increase of depth when you have passed the parallel of the Isles of San Joao, enable the mariner to proceed with confidence.

The coast between San Joao Islands and Atalaia Point should be approached with great caution, as it is said deposits from the River Amazons form shifting banks at the distance of 10 or more miles from the land; the lead, therefore, should be constantly used.

Bay of Turyassu.[*]—Limited on the East by the Isles of San Joao, and on the West by *Point Tamandua*, the Bay of Turyassu presents an opening of nearly 20 miles in breadth, occupied almost entirely by sand-banks. It affords anchorage in its eastern parts, to the N.E. of the *Bank of Muricitanduba*, an anchorage which is more sheltered the deeper you go in it to the South, or nearer the land. It is prudent, however, not to pass farther to the South than S.E. ¼ S. from the mouth of the first river you come to on the western side of the group, and not nearer the land than in 6 fathoms water. A vessel of small draught requiring repairs, and consequently making a longer stay, can, by passing through the narrow channel which runs by the principal group, come to an anchor between them and the *Isle Jabaroca*, where they will be more sheltered from the sea outside.

Point Tamandua projects more than 7 miles to the N.E., and off it is the extremity of a line of breakers, which continues along the coast at a mean distance of from 5 to 9 miles, as far as Cape Gurupi, to which it approaches to within nearly 2 miles. This bank, intercepted by some cuts, which gave access to several intermediate bays, surrounds also the numerous islands which border the coast, and prevents any approach to it.

Near Point Tamandua you may distinguish with difficulty the islet *Motuoca*; then the islands *Acara*, *Maracasumé*, *Pirucaua*, and *San Joaosinho*, each of which gives its name to a bay which it divides from its neighbour on the West. The *Bay of Pirucaua* affords an anchorage of difficult access across the banks, which extend far out to the N.E. from the island of that name.

Morro Pirucaua.—The coast offers one landmark, the Morro of Pirucaua, an isolated hill, which is the more remarkable as it is the first one you meet with westward of the Isles of San Joao.

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[*] "Turyassu (Great Tury) in the lingoa-geral still used among the lower orders and Indians. In Brasil the word *assu* means great, and *mirim* small. The larger portion of the names on this coast belongs to the Tapuya language."—*M. de Kerhallet.*

To the West of the Bay of San Joaosinho you find the *Isles dos Irmaoens*, and that of *Pria*, separated by *Trumahi Bay*. From Pria Island to Cape Gurupi the coast recedes, and forms a large bay, with the islands of *Sumacas*, *Redonda*, *Gurupi*, and *Rasa*, in its opening. The *River Pria* runs into the eastern part of this large bay, to which it gives its name; the western part takes its name from Cape Gurupi, which bounds it on the West.

CAPE GURUPI is in lat. 0° 54′ 5″ S., long. 46° 11′ 3″ W., and is remarkable for its distance from the adjoining land, and by the sands which lie at its foot, and rise in several points, in patches and cliffs. The neighbouring islands serve equally to make it recognisable; but these are not the only characteristics which make it the best landfall of all this coast.

The most particular features of Cape Gurupi are three mountains rising in steps, at equal distances from one another, from the coast of the Bay of Gurupi to a distance of 25 miles in the interior. Although of middling height, they are remarkable, because the land preceding it to the East, and that following to the West, is low, and scarcely to be seen at the distance of 14 miles; while, in clear weather, the hills in question are visible at 25 miles off. However, Lieut. Douglas, H.M.S. *Dart*, 1872, says these hills could not be distinguished, though always looked for, only five or six shapeless mounds being perceived.

Pria Unga Bay.—To the West of Cape Gurupi is the Bay of Pria Unga, the western point of which is formed by *Manejetuba Island*, and on the South of it there are three islands, by which it may be known. The River Gurupi enters the S.E. part of this bay by a mouth of a mile in breadth, and is said to be navigable for small vessels. About 23 miles North of Manejetuba Island is a 12-fathoms bank.

The edge of the bank off the coast, which we have said approaches Cape Gurupi, again runs off to the distance of 4½ miles from the land at Manejetuba Island, and running at this distance, as far as the Bay of Caité, prevents the bottom of the bays from being distinctly seen.

At 12 miles to the W.N.W. from Manejetuba Island is that of *Carauassu*, forming with it *Priatinga Bay*, and with *Point Anajaes* lying nearly 10 miles W.N.W., the *Bay of Punga*. The S.S. *Lisbonense*, June 18, 1872, touched on a bank, said to be about 8 miles N.N.E. from the North part of Manejetuba Island, but H.M.S. *Dart*, in a subsequent search, was unable to find it.

Resolution Shoal, on which the British brig *Resolution*, drawing 15 ft., was wrecked on the 9th of January, 1880, was stated to lie with Carauassu Island bearing about S.W. by S. ½ S., distant 10 miles, or in about lat. 0° 38′ S., long. 46° 36′ W. This position would place it about 12 miles to the N.W. of that given for the sunken danger on which the S.S. *Lisbonense* touched in June, 1872.

Japarigue Islands.—Punga Bay is distinguished from that of Priatinga by the two islands called Punga, or Japarigue, which can be seen from midway between the two limits of the bay. Divided by a small channel of about a mile broad, and lying in a line parallel to the track in running along the coast, the Japarigue Islands never cover each other, but remain perfectly distinct and separated. This observation is important, inasmuch as they cannot then be confounded with the islands which lie in the middle of the Bay of Caité, which is separated from that of Punga by Point Anajaes.

About 23 miles to the North of Point Manitijuba is a shoal upon which

H.M.S. *Growler* found three successive soundings of 4½ fathoms in the middle of the deep-water soundings. The position was not fixed with great accuracy, and it has been called *Buckle Bank*, after the commander of the *Growler*.

CAITE' BAY.—This bay, which is the largest on the coast, receives in its South part the river of the same name. It is remarkable for three small islands, which divide it into two nearly equal parts, the outermost of which stands nearly 4 miles North of the bottom of the bay. The latter island has on its North side a sandy beach, terminated on the West by a small cliff, by which it may be readily known. These islands cannot otherwise be mistaken for those of Punga, because, as before stated, the latter always appear well separated, while the former project over each other, and appear as one.

Caité Bay is almost closed by the great bank which follows the coast as far as Point Motuoca. A cut in the bank leads to an anchorage under the islands, but it is difficult to use, and only practicable for very small vessels.

Maniji, or *Manitijuba Island* is low and wooded, and forms the West point of Caité Bay, which divides it from the bays of *Caoti Paru* and *Miriquiqui*.. These bays have for their common limit a point jutting to the northward, called *Japirica*, which is distinguished from the surrounding coast by its being rather higher, and by the reddish colour of its extremity; besides this, it is remarkable for appearing, more particularly from E.N.E., as an island, rounded at the summit, and well separated from the land. This point is also sometimes called *Falso Carro de Mato*, to distinguish it from the East point of Caité Bay, for which it is sometimes mistaken.

The West point of Miriquiqui Bay is distinguished by a clump of trees higher than those which cover the neighbouring coasts. It has, when seen from some distance to the northward, the appearance of a fortification, and is known to the mariners here under the name of Carro de Mato (the load of bushes), a name which also belongs to the point on which it stands.

In coming from the East you will see, if the weather be clear, some land which is sensibly elevated above that around: this is *Mount Pirassu*, lying about 7 miles S. ¼ W. from the village of Salinas.

BAY of SALINAS FALSAS.—After the Bay of Miriquiqui comes that of Salinas Falsas, remarkable for the downs of white sand lying at the eastern point of the bay. When seen from sea they show like breakers or ships' sails; one of them in particular, separated from the three principal, and raised above the water, is just like a boat's sail when the sun is shining on it.

Soon after having made out these downs, you will have no difficulty in seeing the West point of the Bay of Salinas Falsas. It then appears like a small round island, but is soon seen to be joined to the continent by small hummocks, and forms but one shore with the bottom of the bay. This extreme point, called *Atalaia Point*, is in lat. 0° 33′ 5″ S., long. 47° 20′ 26″ W. At nearly 2 miles from its extremity, which is of a somewhat reddish colour,[*] it

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[*] I would not advise anyone, however, to depend too much upon this reddish tinge for making out the point. The downs of Salinas Falsas, and the sandy coast which precede Salinas Falsas, are better points of recognition.—*M. de Montravel.*

M. de Kerhallet says that the reddish tinge is peculiar to Point Atalaia, although it has been attributed to Cape Carro di Mato: "I do not deny entirely that the reddish tinge shows a beach and downs of white sand, spotted with patches of verdure, while the thickets, which crown its summit, merge into the trees of the interior. A small hillock of white sand at the East end of the beach is rather remarkable.

The Bay of Salinas Falsas presents the following resemblance to that of Salinas. First, downs of white sand, principally on their western side. Second, a long beach of very white sand, which produces, at a certain distance, the effect of breakers; and the summit of the coast being covered with trees in both. The principal differences between them are these: First, the Bay of Salinas Falsas is very deep, and you can hardly see the land at the bottom; that of Salinas forms but a slight curvature in a semi-circular form, in the middle of which stands the village. Second, Carro di Mato, the eastern point of the one, is peaked, and has a clump of trees on its summit, and appears of a blackish tint at 7 miles off; Atalaia, the East point of the other, is less peaked, and terminates in a long point of sand; at 7 miles off you can discern its reddish tint and its rocky character. It has only some bushes on its summit. Third, after having doubled Point Carro di Mato, you can see some land more to the North than it, whereas beyond Atalaia the land only forms a long line, without any projections, to the North as far as Point Curucua, and you also then cease to perceive the breakers.

POINT ATALAIA LIGHTHOUSE exhibits a *fixed bright* light, varied by a *flash* every 2 minutes, visible 17 miles. It appears as follows:—a bright light during 70 seconds; eclipse, or obscurity during 16 seconds; increasing and brilliant flash, diminishing until it disappears, 12 seconds; another eclipse, 22 seconds. Total period, 120 seconds. The lighthouse is difficult to recognise, as it stands close to a forest, the trees of which are nearly as high as the lighthouse.*

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exists, which M. Gueritault assigns to Point Carro di Mato, which he calls Mount Pirassu, but I have never been near enough to see its whole height, and I can affirm that at 7 miles off it does not appear of this colour, and I think it ought not to be approached nearer."

* Pilot Signals at Atalaia Point.—Vessels in sight of Atalaia Point bound for Pará and wanting a pilot, should hoist at the fore, a red flag with a white square in the centre. Near the lighthouse is a flagstaff, from which the following signals are made to vessels in the offing. (Capt. V. D. Goltz, German war-vessel *Augusta*, 1874, was informed that the pilot signals at Atalaia Point have been discontinued):—

No. 1. A white flag with blue cross.
No. 2. A flag, upper half red, and the lower half white.
No. 3. A blue flag.
No. 4. A red flag.

No. 2 signifies that there is a pilot at the station, and a boat to take him on board the vessel.

Nos. 1, 2 signify the vessel is to wait for the pilot, who leaves the shore immediately.

Nos. 1, 3 signify the vessel is to wait, as the tide will not allow the pilot to embark.

Nos. 1, 4 signify the pilot will go on board before noon.

Nos. 2, 1 signify the pilot will go on board after noon.

Nos. 2, 3 signify the pilot will go on board before midnight.

Nos. 2, 4 signify the pilot will go on board after midnight.

Nos. 3, 1 signify that the vessel wanting a pilot is to send a boat to him, if acquainted with the place, which cannot be done without great risk of losing both boat and crew.

Banks near Point Atalaia.—Commander Perier d'Haurive, of the French man-of-war *Laplace*, reported the discovery of a bank near Atalaia, as follows:—On August 10th, 1872, at 4 p.m., anchored in 5½ fathoms, bottom hard sand, 2 miles West of the bank off Atalaia Point, marked on the chart; but in swinging, the stern of the vessel struck in 19½ ft. of water, hard sand. At 275 yards N.E. of this place the soundings were 6½ and 8 fathoms. The bearings taken when anchored were, Point Atalaia, S. 29° E.; West point of Praia Grande, S. 58° W. These bearings place this danger in lat. 0° 30′ 30″ S., long. 47° 23½′ W. The appearance of the water towards the S.W. indicated even less depth in that direction. H.M.S. *Dart* subsequently took soundings hereabout, and the bank is supposed to lie about 1½ mile southward of the position above given.

Nos. 3, 2 signify that there is no pilot at the station, and the vessel is to wait until one arrives.

Signals are also made from the village of Salinas to the lighthouse; the following are the flags used with their signification, which are answered from the lighthouse station by No. 1, a white flag with a blue cross.

No. 1. A white flag.

No. 2. A red flag with a white square in the centre.

No. 1 signifies that there is a pilot and boat to take him on board.

No. 2 signifies that there is a pilot, but no boat.

Nos. 1, 2 signify that there is no pilot at the station.

At night, a light of the natural colour at the village of Salinas, hoisted at the flagstaff, with another at the gaff, signifies that there is a pilot at the station.

Two lights vertical at the gaff signify that there is a pilot, but no boat.

Two lights horizontally signify that there is no pilot.

The above signals will be answered from the lighthouse-station by a single light.

The night signals made from the lighthouse-station to vessels in the offing are the same as those made from the village to the lighthouse, but instead of the natural colour the lights are *red*.

Vessels off Salinas wanting pilots should hoist a light at the fore.

When the signal is made that the tide does not answer for the pilot to go off, vessel should stand off and on, off with the flood, and in shore with the ebb. Commanders of vessels wishing to anchor can do so in 6 or 7 fathoms water, with the light bearing S.E. or S.E. by S. about 3 miles distant. A pilot can more conveniently be received on board with the light on this bearing. Pilots leave the village of Salinas to go on board at high water, which is at 7^h 30^m at Salinas, and at the usual anchorage at 8^h 15^m, on full and change. Attention should be given to the signals made from the lighthouse, and not to those at the village.

The signals will hang from a yard across the flagstaff at the lighthouse in calm weather. At night or in thick weather, if a gun is fired in the vicinity of Salinas it will be answered by one from the shore, when the vessel should wait until the pilot can go on board. Vessels should approach the coast with great caution.

Vessels are sometimes detained many hours, sometimes two or three days, in obtaining a pilot, and masters of vessels who have previously visited this port, sometimes prefer to enter without waiting for one, but this is not recommended. Pilotage dues have to be paid whether a pilot is taken or not. The following notice was issued in 1882:—Fourteen men are now engaged in the pilot service, which is better and more regularly conducted than before; they possess four schooners, one of which is always to be in the vicinity of Salinas Bank. This schooner in the day-time carries a white and red quartered flag, and at night a bright light at the mainmast. Occasionally, pilots are met with at the light-vessel, and also at Taipu Point.

Captain Prentiss, a passenger in the schooner *Azelda and Laura*, reported, in 1869, a rock awash at low water, 2 miles North of Salinas Point. The bark *Ernest* struck on it.

SALINAS BAY.—In approaching from the East, Point Atalaia appears at the end of the coast; but on approaching its meridian you soon discover other land from which the point projects. This is the bottom of Salinas Bay, having at the base a long beach of sand, and some white downs, rather elevated. You will soon see the village of Salinas upon a wooded plain. You will at first only see the church, standing out white on the lands of the second range of hills, but when you are about 6 miles North of the village you can distinguish the red colour of the roofs.

The level land upon which Salinas stands falls gradually to the West, where it terminates in a clump of high trees, which serve to distinguish it. The land of the second range continues to run to the S.W., more elevated than that preceding to the East; and those which follow to the West form, with Point Atalaia, a point of recognition which cannot fail of being remarked.

At 5 miles N. by E. ½ E. of the village is the centre of a shoal, upon which there is but 3¾ to 4½ fathoms. It is 2¼ miles long S.S.W. and N.N.E., and 1¾ mile East and West. It leaves between it and the land a channel 2½ miles broad, in one part of which there is muddy bottom. Some persons have assured us that they have found less than 3 fathoms water on it, but we have never found less than 4, and probably the extent of this shoal is much exaggerated.

SALINAS BAY TO POINT TIJOCA. —Between Atalaia and Tijoca Points the coast is fronted by an extensive sand-bank, showing a breaker at a distance of 2 to 3 miles North of the salient points. Outside of this bank there are numerous other banks, some of them a prolongation of the main bank, others detached from it, with deep water between. East of Point Marapani these detached banks all lie South of the parallel of 0° 30′ S., and West of that point their northern limits are South of 0° 28′ S. Usually they are steep-to, and surrounded by depths of 6½ to 8 fathoms. As a rule, all danger is avoided by keeping in not less than 10 fathoms.

Salinas Bay is bounded on the West by the *Island of Praia Grande*, which separates it from that of Maracuno. This island is remarkable by a very high tree, which crowns it like a tower, and by a sandy beach at its N.E. point. The great bank off the coast, which is close-to at Point Atalaia, commences at the meridian of Salinas to run rapidly to the North to within 2½ miles of the East point of Praia Grande; there it takes a direction parallel with the North coast of the island, and then runs again to the N.W. to 4 miles from the West point of the same island.

You will soon see *Point Marapani*, the western end of *Maracuno Bay*. This point is the North point of *Maranduba Island*, and is distinguished by a little hummock, and sandy beaches and downs, which, although but slightly elevated, are easy to recognize, because it is the only point of the coast between Atalaia and the River Para' which has the same aspect. Its recognition is important, because on its meridian is the northernmost point of the bank off the coast. We have seen that it runs to the North from the meridian of the West point of the Island of Praia Grande; thence it runs to the West, turns sharply to the North to 4 miles from Point Marapani, and takes an East and West direction.

From the meridian of Point Marapani you may see the low point which is the North part of *Cajetuba Island.* This forms, with Maranduba Island, the large *Bay of Piracumbaua*, at the bottom of which you may easily distinguish the outline of the island of the same name.

Then comes the *Bay of Cajetuba*, which divides the island of that name from that of *Curuça*, the West point of which, higher than the land we have seen from Salinas hither, falls sharply to the sea. Particular notice must be taken here of this steepness of Point Curuça, falling abruptly to the water, and not showing any sand at its extremity, to distinguish it well from that of Cajetuba, which is low, and from Tijoca Point, which we shall soon see to the West of Curuça, and which is low, and ends in a large sandy beach. Between these last two points there is a very deep bay, or rather river, bearing the name of Curuça. We shall see hereafter how important it is that we should not mistake *Point Curuça* for any other near it.

At nearly 4 miles from the N.E. point of Curuça Island the edge of the bank bends to the W.S.W., and nears Point Tijoca, which it rounds at a mile distant.

THE RIVER PARA'.

Point Tijoca, in lat. 0° 34′ 0″ S., long. 47° 54′ 18″ W., forms the eastern point of the estuary of the River Para', of which the western limit is Cape Magoari, the N.E. point of Marajo Island. This mouth is 33 miles in width, and from the middle of it you cannot see either coast. It is partly filled with shoals, which we will describe before entering the river.

These banks may be divided into three principal groups, designated by the names of the East, the West, and the Central.

The first consists of the Banks of Bragança, Coroa Nova, and Coroa das Gaivotas, without mentioning the Great Bank along the coast, which we have followed as far as Point Tijoca, and which afterwards joins itself, to the South of that point, to the Bank of Gaivotas. The lightvessel and buoys are liable to drift.

BRAGANCA BANK.—The northernmost of this group is the Bragança Bank, which it is important to make out clearly, as it lies in the usual passage on entering the river. But its position is well indicated by the lightship and buoy to the North of it. It is not generally dangerous, because the N.W. face breaks at all times of the tide, although we have sometimes with a calm sea looked in vain for the breakers. But this extraordinary fact may be due to the circumstance of the sun being about to set, and shedding so strong a light on the water as not to allow anything to be seen in the western quarter. The North extremity of the bank is 8 miles N. by W. from Point Tijoca; it is marked by a *white conical buoy*, with staff and vane, lying in 8 fathoms, 1¼ mile to the E.N.E. of the N.W. end of the bank. Vessels from the East should sight this buoy when near the meridian of Curuça Point, and steering towards it, pass it on its North side. In 1882 a notice was issued that a large white buoy, with staff and red pendant, was moored on the N.E. edge of this bank, about 9 miles N. ¼ W. of Curuça Point. The S.W. point, named

Espadarte, is 6½ miles N.W., and the S.E. point at 4 miles to the North, of Point Tijoca. It is composed of different shoals, of which three, according to the local seamen, uncover at spring tides. They say also that there are some small channels between them, in which there remains 2 fathoms at low water; but for the purposes of navigation we must consider this bank as a continuous flat. It is very steep on the West and South sides, and runs out on a flat to the N.E. and East, on which there is from 3 to 6 fathoms, and the edge on the East side is very abrupt, in fact it drops in the interval between two casts of the lead, from 6 to 12 and 18 fathoms. The bank is reported as extending to the eastward, the East point now lying 7¾ miles N. by E. ¾ E. from Tijoca Point. The Bragança Bank is formed of hard sand, lying, according to the pilots, on a bed of hard mud, and they also say that they do not shift. Nearly the whole of the West and S.W. sides uncover at low water.

Lightvessel.—This iron ship, with one mast, is moored in 15 fathoms of water, bottom of fine sand, at 1½ mile North of the Bragança Bank, Tijoca Point bearing S. by E. ¾ E.; and Curuça Point S.E. She shows a *bright revolving* light every 1½ minute, and quite eclipsed for five seconds, at 30 ft. above the water, visible 8 miles. In coming from the eastward, when the lightvessel is brought to bear West, steer for her, and, passing to the *North* of her, steer to the S.W. as soon as you have rounded her.

Caution.—This lightvessel is often shifted in position by the strength of the tides, and sometimes removed to Para' for repairs. On this account, we have described the banks without reference to their bearings from the lightvessel.

Coroa Nova, and Channel dos Poçoens.—The Coroa Nova lies to the S.S.W. of the Bragança Bank, and is divided from it by a deep channel of a mile in breadth, which was believed to be navigable before *La Boulonnaise* explored it. Capt. de Montravel named it the *Channel dos Poçoens*. There is good depth for any ship, and we shall see hereafter the security it affords for entering the river.

The Coroa Nova is a bank of sand of recent formation, and shifting, at least as far as regards its N.E. end. An old negro fisherman, who had lived on the coast for 70 years, told us that its North end formed and disappeared by turns, which we can readily conceive, when we reflect that a current of 5 or 6 miles an hour runs incessantly through the channel into which it extends.

Channel of Cassard.—The Coroa Nova Bank is separated from that of Gaivotas by a channel as wide, but for navigation much less simple and certain than that of Poçoens. It is narrow, and does not offer any inducement to navigators to use it, as there is not more than 10 or 12 ft. water for 2 miles within its West end.

Coroa das Gaivotas.—This is a large flat of sand, uncovering nearly altogether at low water, and reaching towards the coast-bank, from which it is separated by a small channel, navigable only for boats. Between the years 1866 and 1870, a small tree-covered island grew up on its northern side, the centre lying about 6 miles W. by S. from Tijoca Point. It is an excellent mark for taking bearings, but cannot be relied on absolutely, on account of the changes caused by the currents. There is a shallow channel between Gaivotas Bank and the shore, used by small coasters

Light.—A *fixed bright* light, elevated 35 ft., and visible about 9 miles, is shown on Gaivotas Islet.

The POCO.—Between the Bragança Bank and the lands of Curuça and Tijoca there is a wide and very deep channel, called Poço (the Well). The current in it is violent, and till recently it was considered very dangerous, and that it would infallibly lead to the destruction of vessels driven into it by the currents or by mistake. The Channel dos Poçoens has deep water, and the facility of the route for leaving the river will give confidence to those who use it. However, it is seldom used on account of the shifting nature of the banks.

Santa Rosa and Kiriri Banks.—The western group of shoals is a combination of the flats which must be considered as united to Cape Magoari, although, in reality, they are separated from it by a channel; but it is so narrow, that it cannot be considered as fit for the purposes of navigation. This collection of dangerous flats, which extend to 14 miles East of Cape Magoari, is known in the vicinity under the collective name of *Santa Rosa.* They are all of sand, and break heavily when there is much sea, but sometimes they do not show.

From the extremity of the banks of Santa Rosa you can see clearly Point Magoari from the deck of any ordinary vessel. The flood runs to the W.S.W., and the ebb E.N.E.

Among the group the bank of *Coroa Kiriri* is also to be placed, lying about 18 miles W.N.W. from Point Tijoca, and South of the eastern extremity of the banks of Santa Rosa. This bank, although out of the route of vessels entering or leaving, bounds to the North the bank of Morisoca, of which we shall speak presently. It is said to uncover at low tides, and shows generally at ordinary tides. Anchored off its North point, we saw from the mast-head Point Magoari in full view, although the horizon was hazy, as it generally is in the dry season.

CENTRAL GROUP—TIJOCA BANK.—The South point of the Tijoca Bank lies about 2½ miles W.N.W. from the S.W. point of the Bragança. This cluster consists of three patches, nearly on a N.N.E. and S.S.W. bearing, and one other, that lies N.W. of the northernmost of these. They are known as the Cabeças do Norte, do Meio, and do Sul. The first consists of two shoals, separated by deep water, on which there is said to be as little as 6 ft., in several places. Their position is 11½ miles N. ¾ E. from the island on the Coroa Gaivotas, and 11 miles N.W. by N. ¾ N. from Tijoca Point; both of which are visible from this vicinity. The second is a shoal of about three-quarters of a mile in circumference, nearly 2 miles S.S.W. from the preceding, and 10 miles N.W. by. N. from the same point. The least water on this patch is 9 ft. The third is 2½ miles S.S.W. from the preceding, 9¼ miles N.W. from Tijoca Point, and 7 miles North of the island of Coroa Gaivotas. This patch is said to be very small, with 6½ ft. least water, and it was difficult to find when the locality was being surveyed. These banks are separated from each other by depths varying between 4 and 7 fathoms; their edges are steep-to. The soundings in some places change, in two successive casts, from 11 to 5 fathoms. When there is a heavy sea running, the current produces an appearance of broken water on the shoalest spots, but the sea rarely breaks, and, in general, gives no indication of their position. The nature of these shoals is hard sand.

Buoy.—There is a *red buoy*, which is intended to mark the East limit of Tijoca Shoals. It was originally moored in 5 or 6 fathoms of water, close to the Cabeça do Meio, but is now moored near the South end of the Cabeça do Sul, about 5½ miles S.W. by W. from the lightvessel. This buoy is intended to mark the West limit of the most frequented channel between the Bragança and Tijoca Banks, and should be passed on the starboard side, or left to the westward of the vessel. It is of conical shape, with a staff and vane, visible 3 or 4 miles off.

San Joao Bank.—At about 5½ miles West of the Cabeça do Meio, is the North end of the San Joao Bank, on which the depth is from 3½ to 5 fathoms; this bank is surrounded by depths of 6 to 9 fathoms, and is in general steep-to. Its extent is 3¼ miles long, in a direction S.W. by W. and N.E. by E., by about half a mile wide. The appearance of the surface of the sea gives no indication of the bank.

Adonis Bank.—About 5 miles North of the preceding there is another steep bank, on which the depth varies between 2¼ and 4 fathoms, surrounded by 7 to 9 fathoms. The shoalest parts are separated by a narrow channel of 7 fathoms, and are so small that it is difficult to find them. This bank is the one on which the brig *Adonis* struck and unshipped her rudder.

Monjui Bank.—At 3 miles E.N.E. of the Adonis is the Monjui Bank, the extent of which is not well known, but it may be regarded as within the limit of 5 miles W.S.W. and E.N.E., by 1 mile wide at its West end, thence diminishing to the eastward. The least water found in this space was 2½ fathoms, but the surface of the bottom is very uneven, and there may be shoaler spots.

The three preceding banks are not marked in any way, and it is probable that there exist other elevations of the bottom, not at present known, between the Tijoca and Magoari Shoals. There are undoubtedly deep channels between them that may be followed by vessels bound to and from Para', but it is always preferable to use the main channel between the Bragança and Tijoca Banks.

Bank N.E. of the Light-ship.—About 5 miles N.E. of the position of the light-ship is the South end of a bank, the exact extent and nature of which is not known. This bank is dangerous, and should be avoided; its northern limit is about 10 or 12 miles from the lightvessel. It is about 3 miles wide, and is supposed to have shoal patches scattered over its surface, on which there is said to be not more than 10 to 15 ft. of water, and perhaps much less. The least depth found during the survey was 3½ fathoms.

The banks we have now described leave between them different passes, which are used for entering or leaving the river.

The Bank of Bragança is separated from that of Tijoca by a deep channel about 2¼ miles broad, named the *Dentro Channel*, described hereafter. It is the one generally used for entering the river, and notwithstanding the difficulty of beating through so narrow a passage, it is that preferred by vessels leaving which draw above 15 ft. water. The great space which separates the Tijoca Bank from those of Santa Rosa, takes the name from the North, or Monjui Channel. It would be much more natural to call it the Western Channel.

This channel is generally preferred by vessels drawing under 15 ft. water. We will now proceed with the coast.

THE COAST BETWEEN POINT TIJOCA AND PARA'.—To the South of Point Tijoca the coast forms a bay, into which debouch the channels or rivers, which cut into numerous islands the land lying to the South of Curuça Bay. This indentation is divided into two parts by the projecting point of Tapari, remarkable by three very large trees, which overtop the surrounding vegetation, and almost appear like hummocks. This point forms, in a manner, the eastern side of the mouth of the River San Gaetano, as the Point Taipu is its western limit. Many secondary streams empty themselves into this channel. From the middle of the Channel de Dentro there will be seen, by the mouth of the River San Gaetano, the two small isles Rasa and Ratos, which will serve presently as a point of recognizance for the Cabeça do Sul of the Tijoca Bank.

The *Gaivotas Bank* extends to Point Taipu. Its South part is also called Coroa de San Gaetano, a name which the pilots sometimes give to the islands Ratos and Rasa.

The lands of Point Taipu are visible when you are abreast of the North breaker of Bragança; they then seem like a low island, but, as you approach them, they join the coast, and then you see them run off to the S.S.W., having at a distance the appearance of two elevated ridges.

You will soon see to the South of these ridges a large tree, resembling a tower, which rises near to the North point of the Furo de Bareta. This tree it is important to make out, if you wish to enter the pass which leads into the River of Vigia.

Then comes Cape Carmo, which appears to rise into a peak, but the trees, having their bases in the water, alone cause this appearance.

The *River de Vigia* has its mouth closed in a great measure by the bank called Coroa do Correio, which extends from Cape Carmo to the bearing of S.E. and N.W. of the large tree which we mentioned above, at the mouth of the River Bareta. It follows the coast at half a mile off, leaving a channel of that width at its North end, but which contracts, at the entrance of the river, to about 2 cables' lengths in width. The least depth in the channel is 3 ft. at low water, to above the village of *Vigia*, on the East bank, 3 miles above the entrance.

The Coroa de Correio dries in some parts at spring tides; it is of hard sand, and the sea breaks heavily on it sometimes. It will be seen, however, that it is not to be feared so long as you do not pass to the East of the meridian of Cape Carmo.

COLARES.—Cape Carmo is the N.W. point of the Island of Colares, on which you will soon perceive the village of the same name, situated 6¼ miles southward of Cape Carmo, above a sandy beach, and sheltered from the sea by a line of rocks which, being quite uncovered at half-tide, form a causeway at 1¼ mile from the shore. The land is more elevated than that which has preceded, and the coast runs to the southward from the point contiguous to the village, as far as Point Cocal, where it turns sharply to the East. On this portion of the coast are several patches of rock.

Bahia do Sol.—Point Cocal forms the North extreme of a wide and deep bay, called the Bay do Sol, into which runs, on the North, the river of Furo de Vigia; and to the South that of San Antonio. It is partly filled with a large flat of sand, which dries in places, and runs to the South from about half a mile southward of Point Cocal to within half a mile of the south side of the bay. When you have passed the parallel of the village of Colares, you will see the South side of the Bay do Sol, which terminates sharply at a right angle, and to the West by *Point Marau.*

Pombas Islet.—At nearly halfway between these two points you will see upon the coast a round and wooded islet, which for a long time appears to be part of the surrounding land. This is Pombas Isle. Against it there lies a rocky flat, which extends to nearly a mile North from it, and runs along the coast as far as the East point. This rocky shoal is separated from the sandbank previously mentioned, by a narrow channel, which leads to the bottom of the bay. The sea is sometimes very heavy, more particularly with the flood tide, in the mouth of the Bay do Sol.

Should vessels require to wait for a tide, there is good anchorage in 5 to 7 fathoms, mud and sand, on the meridian of Pombas Islet.

COAST OF MARAJO ISLAND.—From Cape Magoari the coast of Marajo, washed by the River Para', runs about N. by E. and S. by W., as far as the parallel of Cape Carmo. Low, and covered with trees, it presents the mouths of a number of rivers, of which the principal is that called *Igarapé Grande;* its breadth is nearly a mile, and it is affirmed that it is navigable for a great distance in the interior. Nearly all these rivers communicate, either directly or indirectly, with the lagoons which occupy a portion of Marajo Island, and for the most part they are navigable for boats.

At 1½ mile South of the parallel of Cape Carmo you will see the *Village of Joannes*, which name is sometimes applied to the island. Here the coast turns sensibly to the S.S.W., but does not change in appearance.

At nearly 5 miles S.S.W. of Joannes is the village of *Monsarras*, and 5 miles still farther, and close to the coast, is a low island, known by the name of the Ilha da Coroa Grande, lying upon the parallel of Point Cocal.

At this little island commences a great bank of sand, which partly dries, and which, turning to the South at the distance of 2½ miles, extends to the N.E. ¼ N. in a sweep to 6½ miles from the coast of Marajo. Here it bends rapidly to the West, leaving between its East point and the South end of the bank of Coroa Secca, lying to the N.E., a deep channel, 2 miles wide.

Coroa Secca.—The bank of Coroa Secca is 5 miles long North and South, and nearly 2 miles broad East and West. On its South point there was formerly a tuft of trees, which served as a beacon, but they have disappeared, being carried away by the currents, so that it is now only shown by the breakers. The last two banks are steep on their South and East faces.

Coroa Morisoca.—At 6 miles N. ½ W. from the North point of the Coroa Secca is the South end of the Morisoca Bank, which, taking a curve towards the West, extends as far as the Coroa Kiriri, thus extending about 23 miles in a N.E. by N. direction. The Coroa Morisoca dries in many parts of its extent, and has between these higher portions some channels, through which boats pass. The South part of the bank is called *Coroa Morro*, and has a few stunted trees upon it.

The South point of Morisoca is divided from the Coroa Secca by an excellent channel, and very deep in its southern part; the depth of which decreases rapidly from 5½ to 3 fathoms in its North part. This is the channel most generally used by the boats proceeding to the West coast of Marajo.

Thus it is shown that the latter coast, from the parallel of Pombas Island to Cape Magoari, is fronted by a line of banks, leaving between them some navigable passes.

EASTERN SIDE CONTINUED.—At half a mile from Point Marau, lies the little island of Guaribas, which is low and covered with some bushes. Its shores, and the narrow channel separating it from the coast, are clear.

The coast thence runs 4½ miles to the S.W. to *Point Chapeo Virado*, where is established a *fixed bright* light, visible 8 miles. From this point it turns sharply to South, as far as *Point Musqueiro*, where it runs E.S.E., forming with *Barreiras Isle*, farther to the South, the *Bay of San Antonio*. Anchorage will be found with Musqueiro Point bearing about N.N.E. in 3½ to 5 fathoms. A shoal of 1½ fathom lies about half a mile westward of the point.

Between Point Marau and Point Chapeo Virado you will find, at a mile from shore, *Tanheiras Rocks*, several rocky shoals, which cover at high water, and send out a spit under water, which extends to the meridian of Chapeo Virado. This shoal is dangerous, and must be carefully avoided.

In front of San Antonio Bay, and nearly 3 miles S.W. by W. from Point Musqueiro, there is a small wooded island, rocky on its North side and sandy on its South, called *Tatuoca*. It is the advanced guard to the North of a group of islands which lie along the coast to the South as far as the city of Belem. From this island there runs to the northward, for the distance of 1½ mile, a rocky bank, having some heads uncovered at low water.

Jetuba Island, which follows immediately to the South, has also a bank running to the North for more than 1½ mile, joining the bank on which Tatuoca is situated; it is of hard sand, and dries at spring tides.

A *light* is shown on the S.W. point of *Coutejuba Island*, westward of Jetuba; it is maintained by the Amazons Steam Ship Company.

The Bay of San Antonio is formed of a bank of mud, which extends from Point Musqueiro to that which terminates Barreiras Island on the South, and which is divided from Point Pinheiro by the River Magoari. From this point the coast runs directly South to the city of Para'. At 2 cables' lengths W.S.W. of the chapel on Point Pinheiro is a rock of small extent, on which there is but 10¾ ft. at low water.

Fort do Barra, and Light.—The navigable part of the channel is contracted on the West side by the mud-bank which runs from the S.E. point of Ilha Nova, and extends 2½ miles Nortn of it, with an island covered with verdure at 1½ mile from it in that direction; and on the other by a rocky point, off the extremity of which there is a circular fort, called *Forte da Barra*. To the North of the fort, 2 cables distant, is an isolated and sunken rock of 6 ft., which requires attention in passing. A *light* is shown at the fort.

At 1¾ mile S. by W. ½ W. from Fort da Barra there is an isolated rock, 2½ cables from the shore, surrounded by deep water. This rock lies a little West of the line of bearing between Da Barra and the S.W. end of the city of Para', and two iron conical buoys, painted red, have been placed in its vicinity. The northern buoy lies off Val de Caens limekiln, with Fort da Barra bearing N. by E. ½ E.; South point of Nova Island, N. by W. ¾ W.; South point of Fortin Island, N.W. by W. ¼ W. The other is moored close to the western side of the rock. In order to avoid the rock, keep West of the line of bearing from the buoys to Fort da Barra. A small rock, showing at low water, about 2 cables off shore, lies S.W. ¾ W. from Penhacova Chapel. A red buoy is placed off Penhacova to mark the telegraph cable.

After having passed the Fort da Barra the channel widens, and the small islands which have followed it are replaced by a single one called *Ilhas das Oncas*, the shores of which are parallel with those of the continent, from which it is 2 miles distant. But this width is only in appearance; for the channel is divided into two parts, each of less than a mile in width, by a mud-bank, which springs from *Ilha do Fortin*, and extends to abreast of the South part of the city. The least depth in the navigable channel up to the town is 3 fathoms.

Some time after passing Point Pinheiro, you may see on the horizon, the principal church towers which crown the city, and other buildings will soon rise into view; and then the North part of the city will be seen at the bottom of the bay, on the South part of which it stands.

The anchorage is in front of the city, in from 2 to 3½ fathoms, between it and the bank which lies in the middle of the channel; vessels should moor, and for a large vessel a good berth will be found abreast the principal landing-place.

PARA', or SANTA MARIA DO BELEM, is the capital of the province, and lies 1 or 2 miles to the northward of the junction of the River Guama with the Para', and about 75 miles from the lightvessel at the entrance of the Dentro Channel. This city is regularly built, well paved and lighted with gas; it has some fine buildings, of which the governor's palace and the cathedral are the best specimens. The houses are generally of two stories, some of them having porcelain facings. Two hotels afford but poor accommodation. The population of the city is calculated at about 40,000.

Landing for passengers and freight is at the custom-house wharf, where there is a good landing-place for boats and lighters. At half-tide there is good landing at the stone wharf near it. A strong sea-wall is constructing along the front of the town, which will make a wide street, and also prevent smuggling.

Captain Bonham W. Bax, R.N., who visited Para' in 1867, says:—

"Vessels should moor within a quarter of a mile of the town, in from 2 to 3½ fathoms; the depth of the water at the wharf is 6 ft. at low water. The city of Para' has increased greatly within the last few years, and has now many good and well-built houses in the outskirts; it is well drained, the soil being clay and sand. The roads are good, well shaded with the monjuba and palm trees, and kept clean and in order. The dockyard has some fine buildings, but at present no work is going on. There is a gridiron for cleaning ships' bottoms, capable of taking a ship of 600 tons and drawing 7 ft. water; there is also a foundry in the city. The population in 1866 was 36,000, of which 5,000 were slaves, and the remainder principally Indians."

Provisions, &c.—Fresh and salt meat, vegetables, and good biscuit, can be obtained. Salt meat is 5*d*. per lb., fresh beef 6*d*., and bread 5*d*. per lb.

Common articles of ship chandlery are very expensive, and vessels having received injuries are recommended not to go to Para'. The water is dirty and bad, and will not keep good long. Coal may be obtained in any quantity, at moderate prices.

The naval arsenal is kept in good order, but appears at present to be only used as a rendezvous for the small squadron employed on the Amazons. Frigates have been built here; wood is plentiful and good. At the *River Una*, 2 miles above the town, there is a place for heaving a vessel down.

The trade of Para' is carried on principally by Brasilian and foreign vessels. In 1878, exclusive of coasting vessels, 234 vessels of 198,107 tons entered Para, of which 68, or 47 steamers and 21 sailing vessels, of 55,812 tons, were British.

The principal exports are rubber,* cacao, coffee, sugar, cotton, brazil-nuts, sarsaparilla, vanilla, farina, quinine bark, copaiba, isinglass, tobacco, rum, and hides. The value of the exports in 1878 amounted to about £1,667,000, of which 8,021 tons of india-rubber represented about £1,360,000. The imports for the year 1877-8 amounted to £731,578, of which nearly £400,000 came from England. Considering the riches of the country, the trade is insignificant. The duties are excessively high, ranging from 35 to 46 per cent. on imports. It is necessary to take measures against getting rats on board from the lighters. These infest the city and river in great numbers.

The carrying trade between England and this port is almost entirely done by two lines of steamers leaving Liverpool, via Havre and Lisbon, twice a month. Also, every three months a steamer leaves Liverpool, under contract with the Amazonas Provincial Government for Manaos (1,000 miles up the River Amazons), via Havre, Lisbon, and Para'. The British sailing vessels bringing coal to this, as a rule, leave in ballast for the West Indies or North America, seeking homeward cargo, not being able to compete with the steamers.

The foreign steamers are composed of the American monthly line of steamers between New York and Rio de Janeiro, carrying mails, but bringing and taking very little cargo, and the Brasilian mail steamers, three times a month from Rio de Janeiro, carrying mail and coastwise cargo, which trade is very considerable in coffee and sugar.

The trade between New York and Para' is very important, and is carried on almost entirely by fast-sailing vessels, which appear to answer the requirements of the trade.—*Mr. Consul Green*, 1879.

Climate.—There are two seasons at Para', the wet between December and July, and the dry from July to December; September, October, and November are the driest months. In the dry season the mornings are generally calm, or there is a light breeze from E.N.E. to East; as the day advances, this hauls gradually to the northward, and by the afternoon it blows a fresh breeze from N.E. to N.N.E., which lasts till sunset, when the wind falls light. In the wet season there is no regular wind; squalls are frequent, often violent, and rain falls in abundance. The squalls in general come from the eastward between North and South. At times, during this season, the wind is regular for some days together, when the weather is fine, for Para'. The difference between the temperature of day and night is about 20°, and this brings relief after the oppressive heat of the day. The thermometer varies between about 73° and 91°.

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* An interesting account by Mr. Robert Cross, 1876, of the india-rubber trees of Brasil, and the mode of collecting the rubber, will be found in the Geographical Magazine, June, 1877, pp. 152—157.

SAILING DIRECTIONS FOR PARA'

From Maranham to Para'.—Vessels bound for Maranham, either to Para' or the northward, follow the same course as far as the San Joao Islands; from thence those bound to Para' have before them a difficult and dangerous route, and the following general instructions may be found of service.

From a point about 12 to 15 miles East of Itacolomi lighthouse, a N. by W. ½ W. or N.N.W. course leads clear of danger, through the space between the San Joao Islands and Manoel Luiz Bank. Between the parallels of Itacolomi and Point dos Atins, it is dangerous to get into less than 8 fathoms of water, and should the depth decrease below this limit, the course should be changed to the northward, and if necessary the vessel should be put about until it has again reached that limit. It should be borne in mind that, in this locality, the flood sets to W.S.W. at the rate of 2½ miles an hour during springs, and 2 miles an hour at ordinary tides; and that the speed of the current is increased as the shore is neared, and about in inverse proportion to the depth of water. The ebb current sets to N.E. at the same rate. During flood tide, if the depth decreases, the course should be changed so as to avoid having to beat off shore against it. Should the wind fall and it become calm while the flood is running, the very least depth that the vessel should be allowed to drift into is 6 fathoms; as soon as this is reached the anchor should be let go, for below this limit the bottom is irregular, and the changes abrupt. The character of the bottom on this route is white sand.

Having run 60 miles in the direction given, the position will be about on the parallel of the San Joao Islands, which are visible in clear weather from aloft about 15 miles; on approaching this parallel the character of the bottom changes to yellow sand, mixed with a reddish substance, which shows a distinct red speck. The largest of the San Joao Islands appears like a white triangle fringed with hummocks covered with vegetation, which at a distance appear to be little islands separated from the white sand. The San Joao group cannot be confounded with any other part of this coast, and having once seen them the position of the vessel is verified, and the fear of getting too near the coast, or on the Manoel Luiz Bank, is relieved. The bank extending to the eastward from these islands is cleared when they are about 12 miles distant, or just visible from the deck. The shoal, lately discovered, lying about in the centre of the line joining the extremity of this bank to Manoel Luiz Reef, is also cleared by passing just in sight of the islands.

If after running 60 miles from the parallel of Itacolomi, on the course indicated, the land cannot be seen, either on account of night or thick weather, and the depth is 8 fathoms, with a bottom of yellow sand it may be regarded as positive evidence of the position being on the San Joao Bank. Continuing on the same course, as long as the soundings do not decrease there is no danger in crossing the bank. The indication of having crossed it is a rapid increase of depth to 16 and 18 fathoms, and a change in the character of the bottom to gray sand, with black specks, and occasionally broken shells. Lieutenant Kerhallet asserts that the soundings will sometimes indicate a bottom of fine black gravel mixed with shells, and that this is the only place on the North coast where such bottom is found. From thence vessels bound to the northward may haul by the wind and follow their course.

Those bound to Para' should continue some miles further, on a N.N.W. course, and then change it to W.N.W.; during the night they should keep in 10 to 13 fathoms, but during the day the land may be approached until it is just visible from the deck, but never in less than 8 fathoms. Up to this depth the soundings decrease regularly; below it they become irregular, and change abruptly, on the edge of the coast bank, from 6 fathoms to 9 or 10 feet.

When passing in front of Pirucaua Bay, in depths of 1 to 10 fathoms, the Morro Pirucaua will be seen. It is the first landmark West of the San Joao Islands. Notwithstanding that this mountain is of moderate elevation, it is readily distinguished in clear weather above the low land surrounding it.

Maintaining the same depth, when passing the Bay of Pria, the Islands of Sumacas will be seen; and will serve to verify the position, if the weather is such as to prevent the three mountains on the South shore of Gurupi Bay being sighted. Cape Gurupi is also easily recognised, and serves as an excellent landmark.

From the meridian of the San Joao Islands to that of Cape Gurupi, the bottom indicated by the lead will be gray sand with black specks; when abreast of Gurupi it changes to fine black sand, which is different from that of any other locality, and serves as an excellent means of establishing the position at night. Having passed this meridian the bottom again changes to white sand with black specks. Thus, during night or day, the position of the vessel is verified when abreast of Gurupi. Continuing about the same distance from the salient points, the next landmark is the most northern of the Caité Islands, which, as previously stated, are readily distinguished from the Punga Islands by their relative positions, and by the sand beach and white patch on the North side of the former. During the night, the meridian of Caité Bay is also marked by the changes in the character of the bottom, which becomes gray sand and broken shells; sometimes the lead will show the marks of large shells, of which the bottom appears to be largely composed. When abreast of the middle of the bay, the bottom will change to mud for a short distance. There seems to be a belt of muddy bottom trending to N.N.E. from the islands; it is so narrow in some places that it may be crossed between two successive casts of the lead. The bank bordering the coasts extends farther off shore on the meridian of the Caité Islands than elsewhere, and the depth of 7½ to 8½ fathoms approaches nearer to the edge of the bank, which is more abrupt than to the East or West; hence it is prudent to cross the bay in not less than 10 fathoms, or 8 miles from the land. From thence a W. by N. course will lead in sight of Point Cari do Mato, the sand-downs which mark Salinas Falsas Bay, and Point Atalaia; the latter may be approached without fear by keeping in not less than 8 fathoms water, or between 2 and 3 miles from the land.

The general rule for avoiding danger between the San Joao Islands and

Point Atalaia is to keep in not less than 8 fathoms of water, with the islands fronting the coast in sight. Below 8 fathoms depth the soundings become irregular and deceptive; above it, they increase regularly to seaward.

Coasting along near a land so low and uniform as this is, the soundings become the most important guide, and should be frequently made and carefully noted. The changes in the character of the bottom enable the navigator to fix the position with some degree of accuracy when in the neighbourhood of Gurupi and Caitê; when approaching the meridians of these points the soundings should be more frequent, and the arming of the lead examined at every cast, so as to detect any change.

Point Atalaia, when first seen, has the appearance of a round island; as it is approached, the white tower of the lighthouse comes in sight; and the lower and smaller hillocks connecting it with the main land, together with the sand which borders them, having the appearance of breakers, should enable the mariner to identify it. It is advisable not to depend upon the reddish appearance of the point as a distinguishing mark, for it is not distinct enough to be seen at all times. It would be better to look for the white downs of Salinas Falsas Bay, and the sandy shore preceding Point Atalaia, and to remember that the land in the rear of the point is the highest in the vicinity.

As soon as Atalaia is distinguished, it may be approached to between 2 and 3 miles, if it is desired to pass between the outlying shoals and the coast; when on the meridian of the point the village of Salinas is first seen. If it is desired to pass outside of the shoals, which would be the most prudent course for a vessel of deep draught, the point should not be approached nearer than 6 miles, or in less than 10½ fathoms of water.

As long as the wind holds, vessels should await a pilot under way; and by working so as to neutralize the effects of the current, the village can be kept in sight. Should it be deemed necessary to anchor, the most suitable berth is between the largest detached bank and the point, in 5 to 7 fathoms, with Atalaia lighthouse bearing S.E. by S. ½ S., and the church of Salinas S.W. by S. ¾ S.; a vessel in this position is least liable to lose anchors.

When bound to Para' a pilot should, if possible, be taken off Atalaia. The signals made from this point have been given on pp. 352-3. In case it becomes necessary to send to Atalaia for the pilot, the best boat for a surf, and a good crew should be selected; the boat should leave the ship so as to be at the entrance to the little river westward of the village at two-thirds flood. The sea breaks heavily on the bar, and it is dangerous to cross it at any other time of tide, and never after one-third flood. The boat should never wait beyond the first third of the ebb to go out. If the pilot can come off only at night, the position of the vessel should be indicated by hoisting a light in some conspicuous place. The pilots need supervision, being often ignorant and incapable.

Having embarked a pilot, if in less than 10½ fathoms, steer N.W., until this depth is reached; the same depth should be maintained in proceeding to the westward on a W. by N. course, about 5 miles from the salient points as far as Point Cajetuba, where the land commences to trend to the southward, and the distance from it gradually increases. Following this course, corrected always for the set of the tidal current, there is nothing to be feared until on the meridian of Curuça Point, which it is most important to recognise.

Dentro Channel.—Having arrived on the meridian of Curuça Point, the breakers on the Bragança Bank will be seen bearing W. by S. ½ S., about 7 miles distant. Bearings should now be taken of the East point of Cajetuba and the West point of Tijoca, in order to fix the position of the vessel, and to indicate the strength and direction of the current. If this has been correctly estimated, and the position of the vessel is satisfactory, the same course should be maintained, in order to clear the shoals which make out to E.N.E. from the breakers, marked by the large white buoy off their North side, until the sandy point of Tijoca bears S. ¾ E. From thence the course should be set so as to pass about 1 mile to the westward of the breakers, between them and the buoy on the Tijoca Bank, until the most southern breaker, called Espadarte, is in line with Tijoca Point, bearing S.E. From thence the course is S.W. ½ S.; the soundings will change from 10½ and 12½ fathoms, in the space between the Bragança and Tijoca shoals, to 10, 7, and 6 fathoms as you proceed southward.

When the breakers on the Bragança Bank do not show, as is frequently the case, the position given by the bearings of Cajetuba and Tijoca becomes a point of departure. Following the course indicated, the soundings will be 13 fathoms at 8 miles North of Curuça Point, and will change for a few casts, as you proceed westward, to 8½ and 10 fathoms, increasing again to 12 and 13 fathoms. If the soundings have decreased to 7 fathoms, when Tijoca Point bears S. by W. ½ W., it indicates that the vessel is too near to the shoal making out from the Bragança, and should be hauled off to the northward, to attain a position that will permit of the course given above, until Tijoca Point bears S. by E. In this position the soundings will be between 13 and 15 fathoms. From thence the course through mid-channel is S.W. by S. with the ebb, and S.W. by S. ½ S. with the flood, until Tijoca bears S.E. When following this route, if the soundings decrease to 8½ fathoms, and Tijoca Point appears distant, bearing S. ½ E., it indicates that the vessel is too near the Tijoca Bank, and it will be necessary to haul to the southward. If Tijoca Point appears near, and the soundings decrease to or below 10 fathoms, then the position is too near to the Bragança, and it will be necessary to haul to the westward. Since the establishment of the lightship and buoys marking the limits of this channel, the foregoing instructions are in a measure superseded by a simpler one; pass to the northward of the lightship and between the buoys; but, as these are often out of position, or entirely removed, it is necessary that the mariner should have some means of navigating independent of unreliable marks.

The character of the bottom is the same throughout, viz., fine gray sand. It is recommended not to undertake this passage during the night when the lightship is absent, or at any time during a calm with a sailing vessel; for the anchorage in the channel is dangerous on account of the tidal current, which loses some of its force outside.

Remarks by a French Officer on entering Para'.—"Leaving the anchorage at Salinas under sail at 4 a.m., September 5, 1872, at half ebb, we arrived off the entrance to Para' with the beginning of the flood. Keeping the coast in sight, the course to make the lightship is about W.N.W. Marapani, Cajetuba, and Curuça Points may be seen 7 to 8 miles, and bearings of these points will give the ship's position whenever it is desired. At 8 a.m. we sighted the lightvessel, which is moored between the North points of the Bragança and Tijoca Banks; the sea here is generally very rough, and especially during this season. The lightship is a small vessel, and lay across the sea, rolling so as to prevent the lighting apparatus from being hoisted to its proper position. The light is said to be visible 8 miles off, but in reality it is seldom seen over 5 miles.

" Besides the lightship, the banks are marked by two buoys. The white buoy on the North point of Bragança bore E.S.E. when we were close to the lightship; and the red buoy is on the South side of the Tijoca Bank, bearing about S.W. from the lightship. Formerly these buoys were moored East and West from the lightship; but, owing to the very strong currents, the red buoy was frequently broken adrift, and the change to the South point of Tijoca Bank was deemed advisable. When the currents are unusually strong, it is not uncommon for the lightship to change her position, either to the northward or southward. When passing it the position appeared to be North of that given by the chart.

" The navigation of the Para' River is not difficult for steam-vessels, and a pilot is necessary only on account of the tidal currents, with which they appear to be perfectly familiar.

" Considerable change in the outlines of the coast have taken place near the entrance to Para', caused no doubt by the deposits of the river. Banks formerly uncovered at low water only are now small islands, covered with luxuriant vegetation. The northern edge of Das Gaivotas Bank is now an island, just covering with verdure; and, when the exact position can be ascertained, will afford an excellent landmark for bearings. Morisoca Bank, on the West side of the estuary, near Marajo Island, lies in about 0° 47′ S., and is covered with bushes. The bank extending northward from Nova Island is now covered with high mangrove trees, the same as all other islands in the vicinity. To the northward of this there is another island covered with grass. Some of the points have extended out considerably. Musqueiro Point, for instance, extends farther South. It is probable that those banks, on which, in 1843, there was 13 to 16 ft. water, have since become shoaler, and may now be dangerous.

" The course steered was parallel to the general trend of the coast 8 to 10 miles from the banks. The soundings taken every half hour indicated that those laid down on the charts are correct. However, between Itacolomi and Caité, where the tidal current appears to set at right angles to the coast, great caution is necessary, for the coast is very low, and the bank that borders it is dangerous.

" It is reported that the Brasilian Government proposes to erect a lighthouse on one of the San Joao Islands."

Poço and Poçoens Channels.—A vessel finding herself in the Poço, should, if the tide is running flood, anchor at once, and, if possible, nearer to Tijoca Point than the Bragança Bank; for the current is less rapid, and the depth not so great. A good position would be with Tijoca bearing South, and Gaivotas Island W.S.W. From this anchorage a vessel should get under way at the turn of the tide from flood to ebb, and work out with the ebb. The limits of the board are, to the northward, with Gaivotas Island bearing S.W. by W.; and to the southward, the same island W. by S. ¾ S. The position of the vessel should be frequently established by bearings of the various points that are visible in this locality.

Notwithstanding that the least depth found in the Poçoens Channel was 7 fathoms, the pilots insist upon it that this channel is unfit for any vessel of over 10 or 12 ft. draught; and so long as there are no marks for the edges of the banks, or ranges that could be used for avoiding danger, it is recommended not to attempt it.

In the Poço the current is more violent than in the Dentro, and often reaches the rate of 4 miles an hour. The flood sets to S.W.; the ebb to N.E.

Directions for proceeding to Para'.—From the position of Tijoca in line with the S.W. breaker of Bragança Bank, the course is S.W. ¼ S. until Point Carmo bears East, distant 4½ miles; from thence S.W. by S., until Point Chapeo Virado bears S.E. ½ E., distant 1½ mile. As far as the parallel of Pombas Island, if the soundings increase above 8 fathoms, it is an indication that the position is too far West, and the course should be changed to the southward, in order to avoid the banks bordering the West coast.

From the parallel of Pombas to that of Guaribas Islands, the depth increases to 9 or 10 fathoms; from the latter to the parallel of Chapeo Virado it increases to 13 and 16 fathoms, rocky bottom; and from thence to the parallel of Musqueiro Point it will vary between 8½ and 10½ fathoms. All of these are soundings at low water.

When Guaribas Island bears N.E. by E. ½ E., and Musqueiro Point S. by E., the plateau of rocks that makes out from Point Chapeo Virado will be passed, and the course should be changed to South, so as to pass 1 mile West of Musqueiro Point; from thence steer S. ½ W. for Pinheiro Point, and endeavour to avoid being set over to the West side of the channel by the wind and by the currents which set in this direction. When approaching Pinheiro Point, haul off a little, so as to pass half a mile from it, in order to avoid the rock situated 2 cables W.S.W. from the end of the point. When this is cleared, close again with the coast, keeping about midway between it and the islands of the Ilha Nova Bank, and continuing on to the southward, with Forte da Barra open on the port bow until clear of the rocks northward of it. From Forte da Barra steer for the West extremity of the city, and be careful not to bring the buoy which lies to the northward of Val de Caens in line with the fort, until the rock that lies southward of the former, and is marked by a buoy on its West side, is passed. Should the breeze be light, it will be necessary to guard against the current of the flood which sets rapidly to the S.W., between the entrance to the little river Una and the city.

The mark for being near the edge of the bank extending from Fortin Island to the anchorage is the West angle of the hospital—a white house standing in the West part of the town, in line with the church of Carmes in the S.W. part of the town. The anchorage is in 2 to 3½ fathoms, between the lines of the church of San Antonio at the North end of the town, and that of Merces in the centre. Vessels should moor.

DIRECTIONS FOR PROCEEDING TO SEA FROM PARA'.

Vessels leaving the anchorage of Para' should be under way at high water. The limit of the western board for a vessel of deep draught is the hospital and Carmes church in line, or into 4½ fathoms; for vessels of moderate draught, when the soundings decrease to 3½ fathoms. The limit of the eastern board is with Forte da Barra in line with the Cathedral steeples, or with the buoy of Val de Caens in line with Forte da Barra, when the former can be seen. These limits extend to Forte da Barra. North of this the islands of Ilha Nova Bank afford good marks for bearings. When a vessel has weathered the North end of this bank, the limit of the western board is with the East point of Jetuba Island bearing North; and for the eastern board, Forte da Barra bearing South as long as it is visible. It is unusual for a vessel to get farther than the parallel of Musqueiro Point with the first tide; it is better to anchor southward of the point than to continue on, and be obliged to anchor in deeper water on a rocky bottom, and in the full force of the current of the flood; if however it is found that the parallel of Pombas Island can be reached, then proceed on and anchor in the shallow water facing the Bay do Sol. The second tide will be at night, when, if the vessel has been anchored southward of Musqueiro Point, great caution is necessary until the rocks off that point, and those to the northward of Tutuoca, are weathered. When to windward of the latter, the western board should be prolonged to the meridian of the West point of Coutejuba Island during the day, and until the parallel of Marau Point is reached. During the night this board may be prolonged, while the depth increases to 11, 12½, and 15 fathoms, and decreases again to 11½ fathoms, when the ship should be put in stays immediately, and the eastern board held until the depth decreases to 8½ fathoms; these are the safe limits for the channels during the night.

Between the parallels of Marau and Cocal Points, the limit of the western board is the meridian of Point Chapeo Virado; and when to the northward of Cocal Point, the limit is the meridian of Point Marau, as long as it can be seen. The soundings indicate the limit of the eastern board, and the bearings of the coast will enable the navigator to know his position at any time during the day when approaching it. The lead is not a guide when standing toward the the Coroa Grande and Secca, for these banks are steep-to. The currents are always more sluggish close to these banks, and near to the opposite coast, and strongest in the middle of the channel; hence there is no advantage in prolonging the board beyond a perfectly safe limit.

The pilots are in the habit of insisting upon an anchorage in the centre of the channel. This should be opposed by the master, and an anchorage near the shore on the East side preferred to any other. The second ebb will probably enable the vessel to reach beyond the parallel of Point Carmo. The most suitable anchorage is West of Cocal Point, in 5 to 6 fathoms; or between the ledge of rocks extending out from Colares and Point Carmo, on a muddy bottom.

The third ebb will probably enable you to reach a point of departure for Dentro Channel, the anchorage about 4 miles N.W. by N. from Taipu Point. During this tide the limits of the boards are indicated by the soundings, and the distance from the shore. As long as Caromoju Island, in the entrance to the Vigia River, is shut in by Arequesaoua Point, the limit of the eastern board is the meridian of Point Carmo. As soon as the island is open of the point, the limit is Point Carmo bearing S.W. by S. ½ S., in order to avoid the western edge of the Correio Bank. The limits of the western board is the decrease of depth and the distance of the land of the East coast, which should not be too far off to distinguish the important marks.

To pass through the Dentro Channel, it is necessary to have daylight, and to be under way at high water. Stand to the northward and westward until Tijoca Point is just visible from the deck, and then tack to the eastward, and stand on until nearly on the meridian of Taipu Point, if South of the parallel of Tijoca. The third board must end when the soundings have decreased to 7 fathoms; then tack to the eastward, and stand on to within half a mile of the breakers on the S.W. part of the Bragança; and if to leeward of them, until nearly on their meridian. From thence the boards become shorter; that to the westward is limited by the depth of 7 fathoms; that to the eastward by a near approach to the Espadarte, or S.W. breaker of Bragança. The most dangerous point is the Cabeça do Sul of the Tijoca Bank, which is now marked by a buoy. In case that should become displaced, the new island of Gaivotas Bank, on which a light is shown, will serve for bearings to mark the western board. As long as the light-ship remains in position, she offers an excellent guide, and the foregoing directions are very much simplified. Should it be found necessary to anchor in the channel, the West side should be chosen, as the tidal current is less violent on that side.

Monjui Channel.—The North Channel, or, as it is called, the Monjui Channel, is frequented by vessels of less than 15 ft. draught; the only danger is the Adonis Bank, which is only dangerous at low water, or with a very heavy sea. On leaving the anchorage, about 4 miles N.W. by N. from Taipu Point, at high water, steer N. by W., which with the current of the ebb setting N.E. 2 or 3 miles an hour, will make a good North course, which is the one to be made. After losing sight of the land, should the soundings decrease from 5 and 8 fathoms to 3½ or 4 fathoms, it indicates that the vessel is on the Monjui Bank, and should be kept more to the westward until the depth increases. If the soundings decrease to 3 fathoms, and Cape Magoari can be seen from the mast-head, it indicates that the position is on the Adonis Bank, and the vessel should make a short tack to the eastward. If Cape Magoari is visible from the deck, and the depth decreases to 5 fathoms, it indicates that the vessel is too far to the westward. As a rule, when the cape is distinctly visible from the deck, a vessel will be too near the Magoari, or Santa Rosa Banks. The position will be indicated when crossing the Monjui Bank; and when across it, the bottom will change from gray sand to soft mud. Should the wind fall light, or fail, and the ebb is nearly done, it is prudent to anchor, in order to avoid being carried to the southward and westward by the flood; but so long as the wind holds, a vessel should stand on to the northward, while the soundings do not fall below 7 fathoms.

Routes to Pernambuco.—The general route to the eastward is close inshore out of the influence of the westerly current; and by taking advantage of the tide, and every slant of wind, a sailing vessel will generally perform the voyage from Para' to Pernambuco in about thirty days. When N.E. and

E.N.E. winds are prevalent, a current is found running E.S.E. along the North coast of Brasil, and is taken advantage of by coasting vessels. When the weather will admit, a vessel may anchor off any part of the coast without danger. In working along shore, the dry season is considered preferable, as the winds are then fresh and steady. Stand off during the day, and in toward the land at night, so as to be near the coast in the morning to take advantage of the land wind, by which a good sailing vessel will make from 40 to 50 miles a day.

In the rainy season, working to windward is more tedious, as calms, light variable winds, squalls, and rain prevail; a vessel should then stand on the tack that is the most favourable; and as a general rule, should not go outside 30 fathoms of water, and toward the land to a prudent distance. From Para' eastward as far as the Pernaibao, or Paranahiba, there are numerous rivers along the coast; and in getting in with the land attention should be paid to the currents they produce. Should the wind be steady, tack as in the dry season, but do not lose sight of the coast.

Having arrived on the meridian of Mel Point, and failing to get farther to windward, a large vessel should stand direct to the northward for about 180 miles, or until she can weather the N.E. extreme of the continent on the port tack. A small vessel may go inside the shoals of San Roque, where she may anchor at night; and, although there is not room to work through the Santo Alberto Channel, the water is smooth, and advantage may be taken of the land wind in the morning. No difficulty will be experienced in obtaining a pilot in the vicinity of Cape San Roque, or the villages to the westward, for the in-shore channels.

Should the mariner prefer standing direct to the northward from Para' across the Equator to about 10° 15′ N., and then tack, he will save wear of men, sails, and rigging, and will probably perform the voyage to Pernambuco in about the same time. The Brasilian coasting vessels and steamers always take the in-shore route, which seems to be the most used.

TIDES.—The strength and duration of the tidal currents, and the time of high and low water, vary according to the direction and force of the wind in the offing, and the amount of rainfall in the country drained by the Cuajara River and its tributaries; therefore it is impossible to establish an invariable law for the tides in the estuary of Para'.

From the San Joao Islands westward to Atalaia Point the tides are felt 20 miles off shore. Near to the coast the current of the flood sets to S.S.W., during ordinary tides, with an average rate of 1 to 1½ mile an hour; and, during springs, with an average rate of 2 miles an hour. The ebb current sets to N.N.E. From June to February the rate of the ebb is less than that of the flood, rarely exceeding 1 mile an hour; while, during the months of March, April, and May, it exceeds that of the flood by about the same difference. This difference between the strength of the currents of the flood and ebb produces a general set of 18 to 24 miles a day, to the westward, during the months of June to February, and to the eastward during the months of March, April, and May. These tidal currents are stronger and more regular near the coast than they are off shore; hence the necessity of ascertaining the time of the tide when navigating near the land.

It is high water, full and change, at Salinas, at 7^h 30^m. At the usual anchorage, about 8^h 15^m; springs rise about 10 ft.

In the *Dentro Channel* it is high water, full and change, at 10^h 51^m; springs rise 9¾ ft. The flood sets to S.W. by W., with an average rate of 2½ miles an hour during ordinary tides, and from 3 to 4 miles an hour during spring tides. The ebb sets to N.E., with the same average rate as the flood.

It is high water, full and change, at the custom-house quay at Para', at 11^h 40^m; at the anchorage, at 12^h; and on the shores of Oncas Island, opposite the city, at 1^h 20^m. At the anchorage the springs rise 12½ ft., and ordinary tides 8¼ ft. The average rate of the current of the flood is 2¾ miles an hour during ordinary tides, and 3½ miles an hour during spring tides; and that of the ebb is 2½ and 3¼ miles respectively. When the wind prevails from the northward, in the offing, the current of the flood lasts longer than that of the ebb, and runs with a greater force; this difference becomes more marked the longer these winds blow, and the greater their force. At other times the ebb current lasts longer than that of the flood, and there is then a difference in its force which becomes equal to, or a little in excess of, that of the flood.

The difference of the level of the water between the Para' and Oncas sides is the result of the influence of the waters of the Guama and Guajara Rivers, the time of high water in the former being much later than that of the latter; the tides are falling in one when rising in the other. The difference in the direction of the tidal currents, between the two sides of the estuary abreast of the city, is no doubt the result of the direction of the entrances to these two rivers, being nearly at right angles to each other.

RIVER AMAZONS.

The source of this river, which is about 3,500 miles in length, is in the small *Lake of Lauricocha*, near the silver mines of Cerro Pasco, in Peru, at an elevation of about 16,000 ft., and just below the limit of perpetual snow. The first 500 miles of its course is a succession of rapids and cataracts, but for the last 2,500 miles its bed is so little inclined, that the difference in level between its mouth and at that distance from it is only about 210 ft. Although under the Equator, the valley of the Amazons is healthy, and has a comparatively temperate climate; according to M. Agassiz, the temperature ranges between 91° and 73° F., with a mean of about 82°, being lowest in the early morning.

This magnificent stream is now open to navigation, and instead of being merely a source of scientific enquiry, its commerce is being developed by a system of steam navigation. The opening of the navigation to merchant shipping of all nations took place, according to Royal decree, on September 7th, 1867, and on that day was inaugurated with some pomp by Admiral De Lamare.

In 1878 the U.S. corvette *Enterprise* completed a track survey of the Amazons River as far as the mouth of the Madeira, and of the Madeira as far as the Falls of San Antonio, around which the Madeira and Marmore Railway Company are now attempting to construct a road. This survey has demonstrated that it is possible for vessels drawing 16 ft. to pass during nine months of the year, and by careful navigation during the whole year, from Para' direct to San Antonio. A channel for vessels drawing 6 or 8 ft. is always practicable.

The following notes are principally by Captain Bax, R.N. :—

At Tabatinga, 2,000 miles from its mouth, the Amazons is 1½ mile wide; at the entrance of the Madeira River it is 3 miles, and below Santarem 10 miles. It is navigable for vessels of 1,000 tons as far as Manaos, 800 miles up, at the junction of the River Negro with the Amazons. Manaos is the most important town in the interior.

All the confluents can be navigated as far as the towns mentioned in the Decree, viz. :—Tocantins, as far as Cameta, 100 miles from Para'; Topajoz, as far as Santarem, 500 miles from Para'; Negro, as far as Manaos, 800 miles from Para'. In a Decree, dated January, 1873, the Madeira River was declared open to vessels of all nations as far as Port Santo Antonio, 1,300 miles from Para', and within 150 miles of the Bolivian frontier; a custom-house being established at Serpa, 600 miles below Santo Antonio.

The navigation of the river is performed by three steam-ship companies, each receiving an annual subsidy, besides a number of private steamers and other craft. The chief company is the Amazons Steam Navigation Company, which is under contract with the Government to carry passengers, cargo, and mails to the most remote places on this great river and its numerous tributaries. In 1878 it owned twenty vessels, three of which were of 680 tons each, drawing about 6 ft. water. These steamers run as far as Manaos twice a month, and once a month to Tabatinga on the frontier. A vessel under a foreign flag may not carry on a coasting trade up the Amazons, but having touched at Para', can proceed direct to her destination.

The usual route for vessels to proceed up the river is by the pass of Goyabal and Breves Channel, which carries deep water right up; small steamers can go round the South end of Oncas Island into the South branch of the Amazons, but large vessels, with a draught of water up to 16 ft., must proceed by the channel between Arrapiranga and Coutèjuba Island.

The flood tide is not felt far beyond Breves, although the water rises (caused by the flood at the entrance checking the stream running out), so that it would be very tedious for a sailing vessel to attempt to get far up.

Lights have been placed by the Amazons Company as follows :—Coutèjuba, South end; Barra (North of Para'); Paucuera, East side of entrance of Tocantins River; Goyabal Island, South end; Intahy Island, Breves Channel; and Guajara River entrance.

Cameta.—A vessel bound to Cameta, on the Tocantins River, after passing Paucuera light, must shape a course between the second and third islands, lying off the East bank near the entrance of the river, and between two other islands inside them, towards the East bank of the river, along which continue for about 18 miles in not less than 4½ fathoms water (but generally in 7 and 8 fathoms), then strike across S.W. to Cameta on the opposite bank, and anchor about 1½ cable off the town in 8 fathoms.

The land being low, and thickly wooded, its general appearance is so uniform, that it is difficult to distinguish one particular part from another; it is therefore desirable to obtain a pilot, but on account of the little traffic, there are few who can be trusted, excepting those employed by the Amazons Company, to take charge of a vessel drawing more than 6 ft. water.

Cameta, although containing only 3,000 inhabitants, is an important town, as the whole trade of 1,600 miles of river passes through it, the produce being brought down from the interior in small schooners and montarias. The town is dry, the river bank here being 20 ft. high. Deep water runs close to the shore, and there is every facility for the construction of wharves. The rise of the tide is 9 ft., and the velocity of the current about 2½ miles an hour. The water of the river at Cameta is good and fit to drink. Supplies can be obtained, beef being 6d. a pound. Cacao is the principal natural production, and, with rubber, is an article of trade.

The district round Cameta contains a population of nearly 30,000, of which 5,000 are slaves, the remainder chiefly native Indians, but there are many Brasilian and Portuguese families. The police system is good, and there is a school in every village, attendance being compulsory on penalty of a fine. Cameta is healthy, except in the rainy season (December and January), when fever and ague prevail.

SECTION V.

THE EASTERN COAST OF BRASIL, FROM CAPE SAN ROQUE TO THE RIVER PLATE.

I.—THE COAST OF BRASIL, FROM CAPE SAN ROQUE TO PERNAMBUCO.

The late inquiries into the best route for vessels bound across the Equator have given a much greater interest to this portion of the Brasilian coast than it had formerly, when the great object was to avoid nearing it.

We may here also advert to the position and character of the Rocas, which lie in the offing, as given in a former page, and again recommend caution on approaching their neighbourhood.

The WEATHER, &c.—The EASTERN COASTS OF BRASIL, being almost entirely within the torrid zone, South of the Equator, are subjected to the general high temperatures of the lower latitudes, but the great diversity in the equalities of the ground in the mountainous part of the country produces a variation in temperature. On the sea, near the shore, the ordinary state of the air is at 75° to 77° F. from March to September, and at 77° to 86° toward noon, from September to March; but in different places the temperature is higher or lower, according to the localities: for instance, at the high town of *Bahia*, or *St. Salvador*, the mean expansion of the mercury has not been found, between September and January, in the warmest time of the year, higher than 75° in the morning, 79° at noon, and 76° in the evening. At *Pernambuco*, in the same season (5° nearer the line), the thermometer has marked 83° to 84° toward noon, and risen at times to 87°; while at *Rio Janeiro*, nearly 10° to the southward of Bahia, the prevailing heat is much greater, even 90° to 93°. The difference is produced by the varieties of the land.

In the Southern Provinces the winter is rather severe; in the parallels of 27½° to 32°, or of the island of *Santa Catharina*, and of the *Rio Grande de S. Pedro*, snow falls abundantly on the high lands, and hail at times greatly injures the plantations. More in the interior of the country, as the elevation of the land increases, so do the characteristics of winter.

The two seasons, dry and rainy, have already been described.

In reducing the seasons of the year to two divisions only, we conform, says the Baron Roussin, to the usual expression; but the diversity of exposures, the vicinity of mountains, and the various degrees of elevation in the ground, produces many local exceptions to the weather generally prevalent. At Rio Janeiro, for example, it rains much more in the last months of the northern monsoon, which generally is the dry season, than during the rest of the year; in November to March there are frequent storms in the evening, or at sunset, accompanied with thunder and heavy rain; these are quickly succeeded by a clear sky and fine weather. The cause arises from the disposition of the mountains which form the valley of Rio Janeiro, and to the great heat which prevails in it from the sun's diurnal passage toward and from the zenith.

By causes partly analogous, circumstances are similar at *St. Catharine's*, where storms and heavy rains have equal place during several months of the dry season; but these anomalies are limited to certain places, and do not affect, on the coast in general, the characteristics generally assigned.

It may therefore be said, in regard to Brasil, as of Europe, that the state of the weather depends on the situation of the sun in the ecliptic. In general the weather is fine when the sun is in the hemisphere of the place; but the contrary cause produces an opposite effect.

The worst months of the rainy season are marked by frequent fogs, extreme and continual humidity, and very heavy rains, which often continue for 10 or 12 hours consecutively; and it has been remarked that, during the rainy season, the worst weather is at the time of new and full moon, more than at any other period.

It is at this time of year that several maladies prevail, occasioned by the humidity; the heats which succeed produce lassitude, and it has been observed that the maladies are so much more heavy when there is little thunder during the passage of the sun to the equinox. In the bays and on the coast they consist, principally, in dysenteries, flux of a bad character, which, being neglected, if not terminating fatally, degenerates into obstructions, indolent tumours, and chronic affections of the viscera, to be healed only by change of climate.

MAKING OF THE COAST.—The aspect of the Eastern Coast of Brasil, between Cape San Roque, in lat. 5° 29′, and the Isle of St. Catharine, in lat. 27½°, varies considerably in appearance. In the southern parallels, from the isle above mentioned, to about 180 miles northward of Cape Frio, the lands are very high, have many forests, may be seen in clear weather above 50 miles off, and may be safely approached, with the ordinary precautions, on coming in from sea.

But this is not the case in other parts. Farther to the North the land declines in height, and can be seen at a moderate distance only. It must therefore be approached with caution. Such are the portions comprised between *Espirito Santo* and the *Monte Pascoal* (Mount Pascal), between *Porto Seguro* and *Bahia*, or the *Bay of All Saints*, between the *Tower of Garcia da Vila* (lat. 12° 35′), and *Cape St. Augustin*, and the following coast, nearly without exception, from *Olinda* to the North, N.W., and W.N.W., as described in the preceding section; whence it will be seen that from shores of moderate height they decline to low and sandy beaches, and so continue westward, with few exceptions, to Maranham.

The warnings which may be acquired by soundings, in the proximity of land to which you may be approaching, depend on the part you may be on.

These warnings may be of little service on the eastern coast, particularly between the Isle of St. Catharine and Olinda, as the bank of soundings extends to no long distance, and great depths prevail on its outer edges, the parallel of the Abrolhos Rocks (18° S.) excepted.

The soundings give 62 fathoms at 54 miles East from the Island of St. Catharine; 45 fathoms at 36 miles East from that of Sebastian; 32 fathoms at 15 miles to the S.E. of Point Joatinga (lat. 23° 27′); 70 fathoms at 54 miles to the S.E. of the entrance of Rio Janeiro; and 68 fathoms at 21 miles S.E. from Cape Frio. East of the last there is 35 fathoms at the same distance.

Between the parallels of 21° and 22° South, the depths, at 36 miles from shore, vary from 40 to 17 fathoms. At 90 miles East from Cape St. Thomé there is more than 100 fathoms. Soundings extend more to the East and S.E. of the Abrolhos, though but little to the eastward of the meridian of 37° 10′, which is 51 miles to the East of these islets; and beyond this there is shortly no ground at 190 fathoms.

No bottom is found at 180 fathoms at only 24 miles to the S.E. of Cape St. Antonio, of Bahia; but, at 9 miles to the South of this cape, there is 28 fathoms of water. Again, at 27 miles on the parallel of the Morro of St. Paolo, with the Morro in sight to the West, there is no bottom at the depth of 50 fathoms.

From Bahia to Olinda the bank is generally steep; at 27 miles to the East of the Tower of Garcia da Vila the depth is not less than 160 fathoms; at the same distance to the East of the inlet Itapicuru (lat. 11° 45′), the depth is 180 fathoms; it exceeds 170 fathoms at 60 miles from Rio Real and Rio Sergipe (or about 11° 20′ South); and it is found to be nearly 50 fathoms at 30 miles to the eastward of the mouth of the Rio St. Francisco. Finally, on all the coast, nearly to Pernambuco, there is found not less than 30 to 40 fathoms at 27 miles from shore; and at less than double this distance, on the parallels of Pernambuco and Olinda, there is not a depth of less than 110 fathoms.

To the North of the parallel of Olinda the depth comparatively lessens, but it is again very great at a little distance from land. There is found from 6 to 9 fathoms only at 2 or 3 miles from Cape Branco, before the mouth of the River Parahyba, and before the *Fort dos Reys Magos*, or mouth of the *Pontangi;* the same at 4 miles off from Cape San Roque, deepening quickly to 40 fathoms, and then continuing an increase to 30 or 35 miles from the coast.

Hence it appears, that on a great part of the line of coast between the Isle of St. Catharine and Cape San Roque, the depths are, in general, either too great or too uniform to serve as a guidance, or to suffice for correcting an estimation of the route to any particular spot. But it is not to be concluded that it is useless to sound on the coast, only observing that too much dependence should not be placed on the soundings at any distance from shore.

The RECIFE, a singular ridge of coral rock which borders the coast, has been previously noticed. It extends, more or less, all the way from Point Toiro, or Calcanhar (lat. 5° 9½′), to the Morro of St. Paulo (13° 23′), and its intervals form the entrances to the various ports. It has been conjectured that this reef is based on debris brought from the coast by the constant repulsion of the waves, agglomerated by the coralline formation which grows on it, the debris being deposited as the waves become weak in the returning movement, or where a temporary stagnation at a certain distance was produced. The Recife, from its nature, acts as a breakwater, the water within it near the shore being tranquil. In these pools there is fishing almost throughout the year.

The COAST South of Cape San Roque presents nothing very remarkable as far as the Rio Grande do Norte, being composed of small hills more or less wooded. On the shore will be seen several villages, sheltered by cocoa-nut trees. *Point Genipabu*, on the North side of the entrance of the Rio Grande do Norte, and 13½ miles S. ½ E. from Cape San Roque, is distinguished by several white cliffs. The coast reef extends in a semi-circular shape 3 cables from shore, and a detached reef lies about three-quarters of a mile off this point, having a good anchorage in 20 ft. water to the S.W. of it during N.E. gales; this anchorage should be approached from the southward.

From Genipabu Reef, Reis Magos Fort bears S.W. by S. ¼ S., and on this bearing lies another danger, having 2 ft. over it at low water, 1½ mile from the reef.

NATAL, RIO GRANDE DO NORTE.—The first port of any consequence to the southward of Cape San Roque is that called the *Rio Grande do Norte*, or *Potenzi*, on the S.E. bank of which is the small city of Natal; the entrance is protected by the Recife both on the North and South. This river, the *Pontangi* of the aborigines, is a rapid torrent in the rainy season, but in the dry season it is much reduced. The entrance is at a break in the reef, which extends across the mouth of the river, about 4 cables North of Reis Magos Fort. Inside, the entrance is fronted by a line of rocks, which thus turns the channel from West to South suddenly. The channel thence is about 2 cables' lengths wide. The reefs extending from the fort dry and form a natural breakwater to the basin within them.

There was a depth, at low water, of 13 ft. over the bar, the water rising 9 ft. at springs, and 6 ft. at neaps; it has now a depth of only 16 ft. at high water springs, and is marked by two black buoys. Vessels must not attempt to enter without a pilot, the channel being narrow and difficult, and liable to change. In coming from the N.E. or S.E. you will recognise the position of the Rio Grande by the *Morro Pinto*, or *Morcego*, a flattened conical hill, 3 miles South of the entrance. You can also see the town of Natal inland to the N.W. of it; also, to the right, a large white down. The currents are rapid near the coast, running to the N.W. during the S.E. monsoon, and S.W. during the rest of the year.

If, on approaching, you signal for a pilot by hoisting a flag, or firing a gun, he does not attend, you may anchor without the entrance, to the E.S.E. or E.N.E. of Reis Magos Fort according to the direction of the current, in depths of 5 or 7 fathoms, sand.

The depths within, and up to the town, are 4 to 6 fathoms; but there are shoal banks within the reefs on both sides, while the mid-channel is clear. The town is about 2¼ miles from the entrance, and there the breadth of the river is 3 cables, with an increasing depth of water. About 3 miles above the town the river is obstructed by a bank of 1½ fathom.

A six-sided stone fort, called the *Fort dos Reis Magos*, stands on the middle of the southern reef at the entrance; it is insulated at high water, but may be seen several miles off, and is the best mark for making the mouth of the river, the land in the vicinity being very low.

Light.—From a round tower, on the Fort dos Reis Magos, is shown a *fixed bright* light, at 43 ft. above the sea, visible 10 miles. Lat. 5° 45' 5" S., long. 35° 11' 8" W.

Vessels bound to this port should make the land to southward or northward of the parallel of the entrance, according to the prevailing current; it usually runs to the northward, and strongest on the coast. The best time to enter is the last hour of flood, or at the slack, and a pilot is indispensable. When the ledge of rocks extending from the fort to the North is uncovered, the channel is in plain sight, and no other directions are necessary than to follow close to the South side of the channel until the fort comes in sight from *inside* the reef, bearing about S. ¾ W.; the helm should then be put hard to starboard, until the cocoa-nut trees on the South point of the entrance bear S.S.W.; steer for them on that bearing until abreast the first buoy, which is to be passed on the starboard hand; when abreast of this buoy, bearing N.W. by W., alter the course to the westward, and steer toward the second buoy, a little open of the port bow, on a W. ½ S. course, until the lighthouse bears E. by S. ½ S., and the church at Natal S.W. by S. ½ S. From thence steer S.W. ¾ S. until the light bears E. by N.; from this position the anchorage of the city may be steered for S.W. by S. ½ S.; a third buoy lies at the bend of the river. It is high water, full and change, at 5ʰ; springs rise 10 ft.

The bar lies in an East and West direction across the inside of the entrance, and has a depth of about 16 ft. over it at high water springs. After crossing the bar there is a depth of 4 to 6 fathoms up to the city. On the reef extending from the fort several old cannon are fixed for the use of vessels turning sharply in the entrance channel.

The city of Natal, the capital of the province of Rio Grande, is old, and was a place of importance during the Dutch wars; the fortress, by which the city is still defended, was then considered the strongest in Brasil. The business part of the town is built on the banks of the river, the other part being built on higher ground, South of it. The population amounts to about 5,000 inhabitants. Provisions are cheap and plentiful, and coal may be had. A rail way is now constructed between Natal and Nova Cruz, a distance of 75 miles in the interior, and an overland telegraph is being constructed to bring this place in connection with the Brasilian system. The Brasilian coasting steamers call here frequently.

The province of Rio Grande do Norte, which has an area of 13,500 square miles, had a population, in 1875, of 233,979. In 1879, 38 foreign vessels, of 8,191 tons, entered the river, of which 17, with a tonnage of 3,486, were British. The trade is principally in cotton, sugar, and dye-woods; 508 tons of cotton, 9,920 tons of sugar, and 61 tons of hides, being exported in the year 1879-80, the total value of the exports for that year amounting to £132,215, and the imports to £236,852. In the year 1872, 2,674 tons of cotton were exported, but during the last few years this province has much suffered from continued droughts. A trade in india-rubber is springing up.

At 8½ miles to the southward of the Rio Grande is *Ponta Negra*, or Black Point, which may probably derive its name from several clusters of bushes, appearing of a dark-green colour, in contrast with the white sand which constitutes the shore. At 3 miles to the South of this are some red cliffs, which the pilots call *Barreiras do Inferno* (Barriers of Hell), and which extend in the direction of South, at some distance from shore. At 6½ miles southward of Ponta Negra is *Cotovello*, a village to the North of the *Rio Pirangi*. A rivulet falls through an opening of the Recife, before which breakers extend to about a mile. A dozen fishing huts may be seen at the mouth of the rivulet, and some small vessels in the inlet. The reef extends North and South for 3½ miles, and its North end, around which is the entrance to the rocky anchorage, is nearly 1½ mile off shore.

Ponta da Pipa, which is 16½ miles S. ½ E. from Cotovello, takes its name from a rock on the point of land upon which the sea breaks, and which bears the form of a wine-pipe. To the N.W. of it are two villages. At 1 mile N.E. of it is a detached shoal, of 16 ft. least water, nearly half a mile in extent, but leaving a 33-feet channel inside it. There is sheltered anchorage to the N.W. of it.

At 1 mile S.E. by S. from Pta. Pipa is *Point Moleque*, a projecting point, and at 5 miles southward of this is the shallow entrance of the *Cunhahu River*. *Bahia Formosa*, or *Fermosa*, is 4 miles beyond this, and has only an exposed anchorage in 4½ fathoms, partly sheltered from the southward, to the North of the town.

Bahia Traicao, at 19 miles to the southward of Bahia Fermosa, is formed by a bend in the coast line, which here makes out 1 mile to the eastward. The anchorage, in 15 to 23 ft. water, is sheltered from all winds except those from North to N.N.E., and lies within the reef which forms the eastern side of the bay. In the middle of the entrance is a shoal, which is always covered, but may be passed close-to.

To the northward of Bahia Traiçao the coast entirely changes the nature of its aspect, and presents a continuous line of downs of white sand, covered at intervals with bushes, and variegated only by several clusters of cocoa-nut trees. Hereabout the *jangadas* or *rafts* of the coasters, common to the southward, as well as habitations on the beach, almost entirely disappear, and all circumstances indicate the sterility of the country and deficiency of population. Near this parallel commences the *Sertao*, a vast territory extending to the N.W., noted for its sterility, and little better than a desert.

River Mamanguape.—At 5 miles to the southward of Bahia Traiçao, in an inflection of the coast, is the little River Mamanguape, navigable for small coasters. The coast between is distinguished by several small reddish cliffs, and is fronted by the straight barrier reef, at three-quarters of a mile off shore. The South point of the entrance, on which stands the village, is of sand, woody, very low, and projects to the N.E., terminating in breakers, on the North side of which is the entrance. On the North side of this entrance is a village, *Coqueirambo*, which may be seen from the offing; it stands at the entrance to the shallow *Lagoa Acejutibiro*.

The *Province of Parahiba* comprehends the larger portion of the old captaincy of Itamaraca, and extends West nearly 200 miles to the boundary of Ceara. The River Parahiba, which rises in the Serra do Jabitaca, flows to the N.E., and falls into the Atlantic by two channels, divided by the Restinga, or Island of St. Bento. The coast of Parahiba extends about 60 miles along the shores of the sea and bays of the town. The area of the province is 13,500 square miles, and the population, in 1875, was 376,276.

RIO PARAHIBA (meaning clear water in the Indian dialect).—This river, the largest in the neighbourhood, is a place of considerable trade. The shipping trade has, however, fallen off a good deal of late years, most of the productions of the province being shipped at Pernambuco. In 1879 only twenty vessels cleared from this port. A railway, named *Conde d'Eu*, is now being constructed into the interior of the cotton-producing districts, for a distance of about 75 miles, or as far as the town of Independencia, with several branch lines, which will probably increase the importance of the port considerably. The entrance of this river may easily be found by making *Cape Branco*, which lies 12 miles to the southward. It was surveyed in 1867 by Captain Mouchez.

Light.—A light is shown from a lighthouse painted red with narrow white stripes, established on the *Pedra Secca Rocks*, half a mile to the northward of Matto Point, and on the South side of the channel in entering. The light is *bright*, and *revolves every minute*, elevated 52 ft., and visible 12 miles.

Cape Branco is a projecting headland, in lat. 7° 8¼′ S., with several cocoanut trees on its summit. It is the last of the red cliffs which are to be seen on the coast to the southward, the coast northward of it being low and sandy. Besides this, the position of the cape is well marked by the convent of N'a. S'a. da Penha, 1 mile to the South of it. On the left bank, at the mouth of the river, will also be seen the conspicuous convent of N'a. S'a. da Guia, and the steeples of the town to the S.W. of this. At 3 miles from the land there is 7 or 8 fathoms water, bottom of sand, oaze, and coral. The coast hereabout affords neither anchorage nor shelter.

At about 5 miles northward of Cape Branco is the village of *Tambahu*, having a road leading to Parahiba, distant 5 miles. Little or no trade is carried on here. Off the village there is convenient anchorage for vessels wishing to communicate with Parahiba without going up the river. Tambahu will be seen at a distance, with the steeples of Parahiba appearing over the hill at the back of the village. Bring the steeples of Parahiba to bear West, run in, and anchor as convenient. A berth will be found in 5 fathoms water, a mile from the Recife, with Cape Branco bearing S.W. by S. ½ S., and the centre of a group of cocoa-nut trees in the village W. ¾ S. There is no danger, and from a distance of 8 miles the soundings gradually decrease from 10 to 5 fathoms nearer the shore.

From off Cape Branco the country to the N.W. appears like two plains, which, on advancing, becomes distinctly marked. The outer one by the sea is low and sandy, but woody in the higher part; the inner plain presents a line of small hills, wooded, and pretty in appearance. The River Parahiba flows between the two plains, and its direction is S.S.W. from its mouth, which is situated in lat. 6° 56′ S.

The South point of the Parahiba is low, sandy, and woody, and forms the extremity of the first plain above described. The barrier reef extends in front of this plain, at the distance of nearly half a mile. The North point is formed on the second plain by a more elevated coast, and on it are some cocoanut trees. Extensive breakers indicate the mouth of the river, in front of which, at the distance of 3 miles, there is 10 fathoms water.

Of the two points which form the outer entrance of the river, that on the South, in lat. 6° 57′ 15″ S., long. 34° 49′ 31″, is called *Ponta do Matto*, or

Balea (Whale Point), although the fishery for whales does not extend to the North of Bahia; that on the North bears the name of *Ponta Lucena.* These points bear from each other N. by W. and S. by E. 3½ miles; both are distinguished by extensive breakers.

Shoal water extends fully 2 miles to the eastward of Ponta Lucena, and for 3 miles to the N.N.E. The outer shoals, the *Baxios da Lucena*, are nearly dry on their outer edge, which forms a straight line, trending due North and South, and whose northern point is 5 miles from the Barra da Parahiba.

On the shore within Ponta Balea is a low fort, called *Barra*, or *Cabedello Fort*, which may be seen from the offing when off the mouth of the river, and it serves as a point of recognition for the low and even coast, which is destitute of other buildings.

The city of *Parahiba*, the capital of the province, is about 10½ miles from the sea, but the sinuosities of the river make the distance 18 miles. It contains about 16,000 or 17,000 inhabitants, and has several churches and other large buildings. The railway station is to be in the lower town, close to the quay and warehouses. Water is good; supplies plentiful, and moderate in price, and coal may be obtained. The exports consist chiefly of sugar and cotton, the total value of which exported to Great Britain in 1879 amounted to £51,343, a great falling off as compared with previous years, on account of the droughts, which caused great distress in the country. In the year 1874-5 the value of the exports amounted to £438,393. A trade in a species of india-rubber, procured in the country around, is also springing up. Parahiba is in communication with the Brasilian *telegraph* system; and the coasting steamers place it in connection with the chief ports.*

Anchorage.—There is anchorage off the mouth of the river for vessels arriving and not being boarded by a pilot, after making the usual signal by flag, or firing a gun. The best is in 5 or 6 fathoms water, about a mile E. by S. from the lighthouse off Point Balea, which will be nearly in line with the convent Da Guia. In this position you will be three-quarters of a mile from the reef, and 1 mile S.E. by E. from the buoys at the entrance. Examine the bottom before anchoring, and choose your position to the North or South of this anchorage, according to the direction of the wind and current. The pilots live at the village on Point Balea.

Should you be unable to obtain a pilot, the bar may be crossed with risk, as it is subject to change with high winds and strong tides. It is buoyed as follows:—The outer buoy lies in the middle of the channel, 1¼ mile N.E. ¼ N. from the Barra Fort, but outside this there are several shoal and dangerous spots, with only 14 or 15 ft. over them at low water. The second buoy lies on the East side of the channel, 4 cables N. by E. of the fort. The three other buoys mark the West side of the channel and the anchorage South of the fort. The least depth over the bar is about 20 ft. at low water; but in order to follow the deepest water, a perfect familiarity is necessary, there being no available marks. The pilots say 17 ft. can cross the bar at low water, and 25 ft. at high water.

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* PORT CHARGES.—The rates of pilotage since September, 1875, have been increased; they are now for a vessel of 200 tons register, drawing 10 ft., 38 milreis, increasing 2 milreis for every 50 tons or foot of water, or fraction of the same. Vessels remaining in quarantine pay two-thirds of the rate, and those loading at the Sanhaná Bridge, about half a mile above the port, one-third more. Charges for shipping and stowing average on cotton 500 reis and sugar 120 reis the bag, discharging ballast 1,000 to 1,500 reis per ton, but they vary according to circumstances and contract; for a vessel of 300 tons register the total expenses, including commissions, average 12*s.* 6*d.* to 15*s.* per ton.—*Mr. Vice-Consul Shalders*, 1877.

The anchorage for large vessels is West of Barra Fort, in 4½ or 5 fathoms; vessels drawing 15 ft. can reach the town, but ground at low water; above, the river is very shallow.

The land winds are not of frequent occurrence. Vessels, therefore, have generally to beat out against the prevailing N.E. wind, which blows steadily. It is usual for all ships entering to anchor off the Fort Cabedello, in order to be visited; after this they are at liberty to proceed up the river. A different pilot is appointed to take vessels up the river, which, as the wind is generally fair, is an operation of little difficulty or danger, and is almost always effected in one tide. The two shoalest spots are situated, one just above Cabedello, and the other abreast of the entrance of the Tambia River. Going down is tedious, as ships have beating winds, but the reaches are long. The bottom throughout is soft mud. Vessels drawing 15 ft. can load alongside a wharf at the town, grounding at low water on soft mud.

High water, on full and change, at 5^h; springs rise 9 to 12 ft.

The coast from Cape Branco trends generally S. by W., and, like much of the coast to the northward, is fronted by reefs which run in ridges parallel with the shore, with a narrow and shallow channel between the ridges, and sometimes with entrances across the outer line of reefs, which are nearly dry at low water. Off Cape Branco the outer edge is above a mile from the coast, and the first opening southward of it is the *Barreta do Aratu*, 2 miles from the cape. *Petimbu Point*, with a church to the South of it, is 17 miles S. by W. ¼ W. of Cape Branco. Here the reef extends fully 1½ mile, and uncovers at low water, but within the northern end is a narrow inlet through the reef, leading into *Porto Francez*, or *Petimbu*, which affords good sheltered anchorage during the summer for a few small vessels; the depth in the entrance is 4 to 3 fathoms.

Point Coqueiros, or *Guia*, is 5 miles southward of Petimbu Point, and is nearly the easternmost point of South America, Timbabu Point to the North being slightly more projecting. Point Coqueiros may be known by a conspicuous plantation of cocoa-nuts which stands upon it. The reefs here extend for nearly 3 miles off, drying out two-thirds of that distance.

Rio de Goiana.—At 3 miles S.S.W. from Coqueiros Point is the narrow entrance of the shallow and tortuous River Goiana, or Goyanna. The bar is 3 miles S.E. by S. ½ S. from the same point, and has 12 ft. over it at low water; the outer channel between the extensive reefs trending first to the S.W. by W. It is said to be navigable for vessels of small draught as far up as the town of Goiana, 12 miles from the sea.

Point Pedras, in lat. 7° 37′ 10″ S., long. 34° 48′ 48″ W., is low and wooded, 5 miles South of the entrance of the Goiana, and has a village and church on its South side. The outer reefs lie fully 4 miles from the coast, and are parallel with it. The general depths on them being 14 to 16 ft., but inside of them is a channel with from 3¾ to 4½ fathoms, inside of which the sands are nearly dry at low water.

ITAMARACA ISLAND.—At 4¾ miles S.W. by S. from Point Pedras is the North point of this island, whose eastern side follows the general trend of the coast, but it is insulated by a shallow channel, which makes it about 8½ miles long by 3 miles broad. Several rivers flow into this channel, which are navigable by small vessels. Cotton and sugar are grown on the island, and there are also extensive salt-works. It is chiefly inhabited by fishermen whose white dwellings stand amongst the groves of cocoa-nut trees.

At the North end of the island is the channel called the *Barra*, or entrance of *Catuama*, which has a depth of 1¾ to 5½ fathoms at low water. The position of the bar will be known by bearings of Mounts Funil and Selleiro; the channel between the banks leading from the bar to the anchorage is rather narrow, with 1¾ to 3½ fathoms water over sand. The anchorage is off the entrance to the river leading up to *Catuama*. At the South end it has been said that vessels of 300 tons may enter, on a W.S.W. course, between the reefs, which extend outward 3½ miles; but it must be with a fair and leading wind, as there is not sufficient space for tacking. In the channel at low spring tides there is a depth of 2¾ fathoms, and the tide rises 9 ft. The river in the narrowest part is about 4 cables in breadth, and at this narrowest part has a bank, which has a depth of 2½ fathoms over it at low water spring tides. Immediately above this bank and past the fort is deep water, and so smooth that a ship may ride with any sort of cable. To this anchoring place from the bar the distance is about 3 miles.

Mr. Koster says the southern harbour is good, and the entrance to it commanded by a old fort, the entrance to the port being formed by an opening in the reef. It is readily discovered from the sea, being immediately opposite to the channel or river into which it leads, and as there are breakers both to the northward and southward. Having entered, some small breakers will be seen ahead, or rather toward the South side of the channel, unless the tide is out, and then the water is quite still. The anchoring ground is opposite to the fort, and on the outside of it; but opposite to the village of Conception (*N. Sa. da Conceiçao*), which is further in than the fort, there is considerable depth of water. Some parts of the ground are rocky, but others good.

At 5 miles southward of the South end of Itamaraca Island, and 3 miles inland, will be seen the church and convent of *San Bento*, on a hill at the back of the villages which lie on the shore.

Fort Pao Amarello, lat. 7° 54′ 45″ S., long. 34° 48′ 43″ W., is an excellent mark for this coast, but it is only visible 6 or 7 miles. There is a break in the reef off Pao Amarello, affording entrance to very small vessels.

The shore between this place and Itamaraca is composed of cultivated woody hills, separated from the sea by a beach of white sand; at 2 or 3 miles from the Recife, you may find from 10 to 14 fathoms of water, bottom of sand and gravel.

The coast hence southward to Olinda increases in height, and may be seen from a distance of about 18 miles.

POINT OLINDA and Lighthouse.—At 6½ miles to the southward from Pao Amarello is the Point of Olinda, on the parallel of 8° 1′ S. The navigation of the coast between is impeded by extensive reefs. The town of Olinda, remarkable from its white houses and churches, interspersed with trees, lies to the South of the point, which is fronted by reefs, the termination of those extending along shore from the northward.

The *Lighthouse* at Olinda stands on the old fort of Montenegro, on the shore, and shows an *intermittent bright* light, elevated 62 ft., visible 10 miles off.

Ships coming from the northward should, in passing the Point of Olinda, give it a berth of 3 miles, keeping in not less than 10 fathoms, for within that distance the soundings may become irregular, and the reef in many parts is steep-to. A *white buoy*, visible 5 or 6 miles, lies in 5 fathoms at about 1¾ mile S.E. by E. ¾ E. from the light on Olinda Point, on the southern edge of the shoal water.

PERNAMBUCO.

The *Province of Pernambuco* has constituted an important, if not the most important, part of the Brasilian empire since the Dutch conquest. It abounds with many good harbours, and the soil is very fertile. Little has been done towards the exploration of the mineral resources of this province, but it is said that many districts abound in precious metals, and that marble exists in abundance. Coal is reported as existing near Pernambuco. The surface of the country along the coast line, and for 10 or 15 miles inland, is generally flat and sandy; from thence the land becomes hilly, until at 50 miles it runs into extensive table land and mountains. The province contains 60,000 square miles, and 150 miles of coast, with a population, in 1878, of 832,523, of which 89,028 were slaves.

Its ports are all formed by that wonder of nature, the Recife. Mr. Cowper, formerly H.M. Consul at Pernambuco, considers that this reef is of coralline origin, and that when it has reached the surface, the insects abandon their labour, and the interstices of their beautiful fabric become choked with sand and broken shells, which after a time become incorporated with it, and form in appearance what is a rough sandstone.

The city of Pernambuco is the principal place of trade on the Brasilian coast, next to Rio Janeiro and Bahia. The land in the vicinity is fertile and well cultivated, producing principally sugar and cotton. Although not of that elevated and grand description as the land about Rio, hereafter described, it affords the most pleasing prospects, from the richness of its plains and the numerous seats scattered in every direction. The summit of Olinda, on approaching the land, may be recognised at a distance of 15 to 18 miles.

The Recife, or Reef, which forms the harbour of Pernambuco, runs in a parallel line with the shore, at about 2½ cables distant from Cocoa-nut Island to the southward, to abreast of Fort Bruno to the northward. Near its northern extremity is a small octagonal tower, called *Picao*, which assists Fort Bruno in commanding the immediate entrance to the harbour. Shoal water, with patches of rock, extends for about half a mile N.E. by N. from Picao Fort; its extremity is marked by a *red* buoy.

The LIGHTHOUSE stands about 50 yards northward from Fort Picao, on the point of the reef. The tower, octagonal and painted white, is built on a rock, which is covered at one-quarter flood, lying 3 miles S.W. ½ S. from Olinda Point; it shows a *revolving* light, visible 15 miles off, and attaining its greatest brilliancy every minute, but showing twice *bright* and once *red*, with eclipses of 5 seconds. This alteration of colour distinguishes it from the Olinda light.

The CITY of PERNAMBUCO, the third in importance in Brasil, is divided by the rivers *Biberibe* and *Capibaribe* into three parts. The first part near the sea being named *Recife*, nearly entirely occupied by business houses and the arsenal; the next, situated on an island, named *San Antonio*, is the best and most important; the third part, named *Boa Vista*, is on the continent.

The islands on which the town is built are connected by bridges, one of which is a most beautiful structure, constructed by the Dutch, when they took this place from the Portuguese in 1670. It consists of fifteen arches, under which runs a strong and rapid river, that comes many hundred miles down the country. On each side of this bridge are shops full of European merchandise, particularly English manufactures, or, as they are called by the Portuguese, "*Facendas Inglesas.*" The river is seen winding up as far as Olinda; on either bank beautiful white cottages, intermixed with mangrove and cocoa-nut trees and fruitful vineyards, the Indians paddling down the river with their unwieldy canoes, the fishermen on the beach drying their nets, and nature displaying her gayest verdure, form altogether a *coup d'œil* which it is impossible to describe. Another bridge is a very long wooden one, in which there is nothing remarkable, more than its being quite open to the breeze which comes down the river; and is, on that account, much resorted to in the evening. An iron bridge has been constructed over the River Capibaribe, and another over the confluence of that river with the Biberibe. Another bridge is to be built from the Recife to the San Antonio quarter. The town is lighted with gas by an English company, and a great part of it is now well drained.

The population of the city, with its suburbs, in 1878, was calculated at about 94,493. One of the most interesting buildings is the prison, which Captain Mouchez thinks would serve as a model to similar buildings in Europe.

The most busy time here is from December to March, during the loading of the cotton and sugar. In 1880, 1,047 vessels, with a total tonnage of 674,227, visited Pernambuco, of which (exclusive of the mail steamers which amounted to 72) 35 steamers of 26,743 tonnage, and 227 sailing vessels of 55,456 tonnage, were British. The exports consist principally of sugar, cotton, and hides. In the year 1879-80, 123,362 tons of sugar, 60,916 bales of cotton, and 91,025 hides were exported, the total value of the exports for that year amounting to £2,005,664. The imports chiefly consist of iron goods, flour, and provisions, the total value of which for the same year was £2,231,696. In the same year 25,314 tons of coal were landed here.

The progress of its mercantile importance has been much increased by the numerous lines of steamers calling here, there being regular communication with England, France, and the United States. The coasting steamers make frequent calls here. You can now write and receive an answer in a month from Europe. A *telegraph cable*, laid in June, 1873, to the pre-existing cable of the West Indies, joined this port with Europe and the United States. The Brasilian Submarine Telegraph Company's cable was also successfully completed on June 23rd, 1874. This cable, joining Lisbon with Pernambuco, is landed also at Madeira and St. Vincent. Pernambuco is also in telegraphic communication with the principal ports on the East coast of South America.

The appearance of Pernambuco, when seen from the water, is peculiar; its side is flat, and but little elevated above the level of the sea. The white high buildings erected on the praya seem to rise from the ocean. Inseparable from this view of Pernambuco is that of Olinda, on a bold and picturesque hill 2 miles North. Its natural appearance caused Duarte Coelho, as he arrived on the coast, in 1530, to exclaim, "O linda situaçao para se funda uma villia!"—"O beautiful site for a town!" His exclamation was immortalized by being used, in part, to furnish a name.

Olinda, built upon a hill, has white houses and massive churches, now going to decay, with luxuriant foliage interspersed among them, in which those edifices on the hill side seem to be partially buried. It continued the capital of the province for about 200 years; but at length, owing to its unfavourable position for commerce, from being too far from the Recife, which forms the only harbour near, a town gradually arose up near the Recife, by which name it was called. Olinda is now of little commercial importance; a local tradition ascribes its downfall to the wickedness of its former inhabitants. From Point Olinda a line of islands sweeps inward, terminating at Cape St. Augustin, and forming a semi-circular *reconcave*, analogous to that of Bahia. The summit of the highlands is crowned with green forests and foliage. The lighthouse on Olinda Point has been before described.

At a distance of from one-fourth to half a mile from the shore at Recife is the reef of rock already mentioned as extending along a great extent of the northern coast of Brasil. Its top is scarcely seen at high water, being then covered with a surf. At low water it is left dry, like an artificial wall, with a surface sufficiently even to form a promenade rising out of the sea. It is from 2 to 5 rods in breadth. Its edges are a little worn and fractured, but both its sides are perpendicular to a great depth. The rock in its external appearance is of a dark brown colour. When broken, it is found to be composed of a very hard species of yellow sandstone, in which numerous bivalves are imbedded in a state of complete preservation. At several points deep winding fissures extend through a portion of the reef, but in general its appearance is regular, much more so than any artificial wall would be after exposure for ages to the surges of the ocean. For 1 mile South of the lighthouse it is very steep-to, having 24 ft. water close-to. Southward of this it is fronted by the Afogados Bank, hereafter described.

Opposite the northern end of the town, and just northward of the lighthouse, there is a passage through this reef called the Picao Channel, which appears as though a breach had been artificially cut.

Close to this opening, on the extremity of the reef, on the South side of the Picao Channel, stands the fort, built by the Dutch. Its foundations were admirably laid being composed of long blocks of stone imported from Europe, hewn square. They were laid lengthwise to the sea, and then bound together by iron. A wall of the same origin extends from the base of the fortification to the body of the reef.

The Harbour of Pernambuco is wonderfully convenient. It is formed by the natural pier, extending 5 miles in a direct line; this is a coral reef so exactly straight and even, that one would almost imagine it the work of art. The vessels lie alongside each other in tiers, moored head and stern, at a short distance from the shore, and close to this reef, which at high water spring tides is nearly on a level with the surface of the sea, and forms an excellent barrier.

The *railway*, which commences at Recife, is a portion of a project which was to connect the River Sao Francisco at a spot above the Falls of Paulo Affonço with Pernambuco, and to be 400 miles long. Of this 77½ miles have been completed to Una, a single line opened on November 30, 1862. It is now being extended to Garanhuns, 90 miles from Una, and elevated about 2,600 ft. above the sea, which will probably be resorted to as a sanitorium by invalids from the hot humid climate of the low land.

Another railway to Limoeiro and Nazareth, a great sugar and cotton district, about 60 miles West of the port, is now nearly finished. A railway is proposed from this port to Jabotao, Carauru, and Victoria, running between the San Francisco and Limoeiro lines, with a total length of about 77 miles. Steam tramways run to Olinda and Caxanga, both about 8 miles long. The street tramways, worked by mules, and the draining scheme, being carried out by the English Drainage Company, greatly improve the town.

Supplies can be obtained at Pernambuco at prices about the same, and sometimes less than at Bahia and Rio. Prices rise when the road is very full of shipping. *Water* is brought alongside in tank boats, containing 13 or 14 tons. This is brought from the River Biberibe, and costs about 7*s*. 6*d*. per ton at the outer anchorage. It is not always good, being sometimes brackish, on account of very high tides, or muddy after rains. Coal is plentiful, and moderate in price. Extensive repairs can be made inside the reef, but materials are expensive.[*]

Winds and Climate.—The S.E. trade blows home to the coast in this vicinity, but is subject to frequent changes between N.N.E. and S.S.E. While at anchor in the road, with the breeze steady and fresh from N.N.E., vessels are seen hull down in the offing running to the northward with a free wind South of East.

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[*] *Currency.*—The currency is entirely paper money, with nickel and copper for small coins. Of nickel there are two coins, the one being of 200 reis (about 5*d.*), and the other of 100 reis. Of copper there are three pieces, namely, of 40, 20, and 10 reis, or a farthing, which is the smallest coin. There is frequently a scarcity of small valued paper; the lowest note is for 500 reis, or 1*s*. The notes continue in circulation even after they are in a most dilapidated and dirty state. Occasionally notice is given by Government that a certain series or issue of notes will be withdrawn from circulation after a fixed date, after which for a further period they are only received at a discount of 10 per cent., which is gradually increased, and finally the notes are not received at all. This frequently is a great hardship, especially on people in the interior who are unaware of these notices of withdrawal. This does not tend to increase confidence in the paper currency.—*Mr. Consul Bonham*, 1881.

At Pernambuco the heat is excessive, the thermometer frequently being at 90° in the shade. During the night it is always calm, with much lightning. At about 9 a.m. the sea breeze comes gradually, and is strongest about noon, when by degrees it dies away into a calm, that generally takes place towards sunset. Inside the reef a land breeze is occasionally felt, but this does not extend to the roads, where the wind is usually between N.N.E. and S.S.E.

The town of Pernambuco is considered very unhealthy, yellow fever being prevalent here from November to March. Seamen are admitted to hospitals through the influence of their consul. In the *dry season*, between September and March, the wind is usually from between East and N.E., with fine weather and a clear sky. In the *rainy season*, from March to September, with winds from S.E. to S.S.E., and sometimes from S.S.W., the rains are abundant, falling most plentifully in June and July. South by the West to North winds are very rare, and, as in all northern Brasil, they are unhealthy. On account of the prevalent winds being from seaward, the climate is not so bad for vessels in the roads, although fevers are frequent in the town.

SAILING DIRECTIONS.—*Landfall.*—Experience has taught that within 25 miles of the land the wind entirely changes its direction: for this reason, it is thought better by some, during the S.E. monsoon, or from October to January, to make the land of Olinda instead of at Point St. Agostinho, as generally recommended, though the land should be made at the latter point from February to September. In order to avoid all chances of an unfavourable shift of wind, it is recommended to steer directly West for the lighthouse when 20 miles East from it, as the wind is sure not to be unfavourable for approaching the land. Having the sun at your back in the morning makes it safer to approach the land then than later in the day. When approaching from the northward during the day, the mark for clearing the shoals off Point Olinda is to keep a church with two steeples, situated a little northward of the largest church of Pernambuco, open South of the lighthouse; during the night they will be avoided by keeping the Picao light bearing North of W. by S. Approaching from the southward, Olinda should be kept bearing nothing East of N. by E., until Picao lighthouse bears N. by W., when it may be approached on any bearing between W.N.W. and N. by W., taking care to avoid Forbin Rock, of 2½ fathoms. Allowance must always be made for the *current*, according to the monsoon.

Olinda Banks and Buoy.—Captain Mouchez says:—The reefs lying off Point Olinda do not extend more than 1 mile from the coast, but the depth of 5 fathoms is at 2 miles East or E.S.E. from the point. Formerly the reefs were supposed to extend farther off. On the outer extremity of this shoal water, at 1½ mile S.E. by E. ¾ E. from Olinda light, a *white buoy* is moored, visible 4 or 5 miles off. To the North of Olinda Point the 5-fathoms line approaches close up to the reef.

English Bank, on which the depth varies between 12 and 18 ft. at low water, is a detached shoal, three-quarters of a mile long by one quarter of a mile wide; the surface is very uneven and rocky; the centre of the bank, with 2 fathoms water, bears East nearly 1 mile from Picao light. The North end is marked by a *red and white striped buoy*, and the South end by a *red buoy*. These buoys, however, are not to be depended upon.

The pilots assert that the Olinda Channel, lying between the North end of the English Bank and Olinda Shoal, is filling up, and is now so intricate as to require a pilot. It is advisable, therefore, to pass southward of the bank in entering. To clear the South end, keep the light in range with the two South turrets of Fort Bruno bearing N.W. by W., and steer for them on this bearing until the church East of the remarkable tree on Olinda heights is in line with the jetty in front of that town, bearing N. by E. ¾ E., which bearing marks the West edge of the bank. The East side lies with the jetty in line with the house West of the tree bearing N. by E. ½ E.

The North side is cleared by keeping North of the line of the highest steeple of Boa Vista on with or northward of the light, or the Cruz de Patrao (the beacon on the shore between Forts Bruno and Buraco) on with St. Amaro church, situated among cocoa-nut trees. With S.E. winds the centre of English Bank breaks, and it is dangerous to cross it in boats. At high water, generally, it is not dangerous. At about 3 cables N.E. of the North end of English Bank there is a detached bank of 4 fathoms at low water, the depths surrounding it being 4½ or 5½ fathoms.

Forbin Rock, a sunken rock of 14 ft., about 150 yards in diameter, lies near the southern part of the man-of-war anchorage, at 1½ mile S. by E. ½ E. from Picao lighthouse, and 1¼ mile S. by W. from the southern buoy of the English Bank.

Afogados Bank commences abreast the village of Afogados, 1¼ mile southward of the lighthouse, and from thence extends at about 1 to 1½ mile from the shore parallel with it for 1¼ mile. There are some spots with as little as 6 to 10 ft. on the bank at low water. Its eastern edge lies with Picao lighthouse in line with a fort bearing about N. ½ E.

The two entrances through the reef are the Picao Channel, or Little Bar, and the main entrance, or Great Bar, as hereafter described.

Picao Channel, or the *Little Bar*, is formed by the South point of the patch of rocks lying between this and the Great Bar, on the North, and by the *Turtle Rock* on its South side, which terminates the reef extending off from the lighthouse. This pass, marked by two red buoys, is very narrow, with a depth of 10 ft. at low water, and 18 ft. at high tides; but the pilots only take vessels over it drawing 14 or 15 ft., on account of the variation in the depth, caused by the wind, &c. it being always difficult to tell the exact depth of water over this bar. Dredging is carried on at an expense to the Government of from £10,000 to £20,000 per annum. You enter this channel with the two South turrets of Fort Bruno in line, until inside the reef, when haul close round the reef, and keep along it to the southward until nearly up with the first tier of shipping, where you anchor and wait for orders from the harbour-master.

Poço, or the Well, where large ships load and discharge their cargoes, lies immediately to the North of the reef, and has a depth of 3 to 4 fathoms water in it. The main channel to it, called the *Great Bar*, is between some detached sunken rocks, forming the East side of this basin. This channel is marked by two buoys, between which there is 14 or 15 ft. water. The leading mark for the channel is a beacon on the sand-spit, about midway between Forts Buraco and Bruno, in line with St. Amaro church.

Vessels having crossed either the Great or Little Bar will find the shoalest part of the entrance at the *second bar*, which lies between the Picao Fort and of the reef and the first landing of the town, where there is a depth of only 9 ft. at low water.

Port of Pernambuco or Mosquerao.—The Mosquerao is a magnificent natural basin, formed between the reef and the town, and sheltered from the prevailing winds by the reef. It is 1 mile long by 1¼ cable wide, with depths of from 3 to 4 fathoms. At very high tides, with strong winds, the water sometimes breaks over the reefs, but this is very seldom, and then only inconveniences a few vessels. Vessels are moored in 3 or 4 tiers, with 14 or 16 vessels in each tier. Vessels drawing 19½ ft. can get in at high water springs, but as a rule those of more than 16½ ft. discharge and load by lighters outside. It has been suggested to improve the port by the construction of jetties, &c.; dredging is always actively going on.

Tides.—Captain Mouchez, who visited this port in 1868, says:—"The tides are pretty regular, but the time of ebb and flow does not always correspond with the calculated time of high and low water, the ebb lasting a little longer than the flood in the rainy season. I made observations during two or three visits here, and found the time of high water, full and change, to be at $4^h 51^m$, the water rising from 7 ft. 6 in. at high tides to 4 or 5 ft. at low tides." The current inside the reef is sometimes very strong.

Pilots.—Vessels approaching Pernambuco, and intending to enter the port, should approach with the lighthouse bearing about West, and passing to the South of the English Bank, as before explained, make the signal for a pilot, which, on the Brasilian coasts, consists of a red flag with a white square in it; the pilot boat, painted red, carries a red and white chequered flag. The pilots come off 1½ hour before high water only, and will board you as far off as 1 or 2 miles from the bar. Captain Mouchez says that only the older pilots can be trusted to take charge of a sailing vessel, although the pilot service is excellent, and the younger ones are quite safe with a steamer. Pilots are furnished by the Brasilian Government, and the dues are the same whether you employ one or not; besides the difficulties of the bar, they are indispensable for mooring the vessel to the reef. A harbour launch and crew are provided by the harbour-master, and this must be paid for in addition to the pilotage. There are five steam-tugs to tow the lighters, and also to assist vessels in entering or leaving the port when necessary.*

Outer Anchorage.—Vessels will find good anchorage to the South of the English Bank, the best holding ground being with Picao light bearing N.W. ¼ N., three-quarters of a mile distant, and the remarkable tree on the heights of Olinda N. by E. ¼ E., in a depth of 5 fathoms. With Picao lighthouse bearing North of N.W., the bottom is rocky; it is best always to examine the bottom before anchoring anywhere.

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* PILOTAGE DUES.—The pilots' dues are very high at Pernambuco. Captain Mouchez says they are as follows:—For entering the Pogo, or the inner port, starting at 11,000 reis (22*s.*) for a vessel drawing 9 ft., of 80 tons burden; the charges are increased 1,000 reis for every extra foot draught, and also 1,000 reis for every extra 50 tons burden.

The port anchorage dues are abolished, and a table of rates called *light dues* established. for which see note with description of Aracati, applicable to all Brasilian ports.

Besides these there are heavy charges for mooring and unmooring; a sailing vessel of 250 tons, paying altogether dues to the amount of 210,000 reis, or £20 10*s.*

A tax of 50 reis per register ton, and 3 per cent., is also charged on foreign ships.

Another good berth, and nearer the town, is in 4½ fathoms water, midway between the South buoy on the English Bank and Picao Light, with the lighthouse bearing W. by N., and the remarkable tree at Olinda N.N.E. The difficulty of this anchorage is in weighing with safety, and casting so as to clear English Bank. Captain Mouchez says the best anchorage during the S.E. monsoon is at 2 miles between S.E. by S. and S.E. by E. from the light, in 6 or 7 fathoms, with Fort Picao in line with Fort Bruno, and Olinda Point on with Pao Amarello Point, bottom of sand, gravel, and broken madrepores.

Vessels must be prepared to weigh or slip in case of bad weather, the holding ground being uncertain. It is much better for vessels intending to remain here for any time, to enter the inner harbour, except during the prevalence of yellow fever, when all vessels have to remain outside the reef.

Laminhas Road, lying between the English Bank and the bars, has a depth of 5 fathoms, and is used by large vessels who are unable to enter the port. There is good holding ground. The best position is E. by N. or N.E. by E. from the light.

REMARKS ON, AND INSTRUCTIONS FOR, PERNAMBUCO.

Under favourable circumstances, a ship from the eastward, bound to Pernambuco, should get into the latitude of the lighthouse, or about 8° 4′ S. By night the revolving light will be seen, as already noticed. On approaching the coast the lead should be used; soundings may be gained at about the time the land is first seen from the mast-head, in about 50 fathoms, sandy bottom.

On falling in to the northward of the port, the lighthouse not in sight, care should be taken not to run too far in, or into less than 20 fathoms, until daylight. The town of Olinda, being seated on an eminence, cannot be mistaken. On approaching it in the morning, from the eastward, its appearance is beautiful. Having Olinda in sight, with its churches and other large buildings, the next objects will be the lighthouse, Fort Picao, Fort Bruno, the shipping, and arsenal, in the Port of Pernambuco.

You now bring the lighthouse to bear W.N.W., and run in upon that direction, thus avoiding the Olinda and English Banks. You may anchor in 8, 7, or 6 fathoms, at 1, 2, or 3 miles from the lighthouse, but do not bring this to bear more to the northward than N.N.W., as within this line the bottom is rocky, and there is a shoal at about a quarter of a mile from the reef.

To a stranger approaching northward of Pernambuco, it should be known that the land will appear verdant as far to the northward as *Itamaraca*, and no appearance of white banks of sand. When abreast of the North end of this island three large cocoa-nut trees will be seen to the W.N.W. Olinda may be seen from the mast-head at the same time to the S.W., and the white fort or battery of *Pao Amarello*, at 7 miles to the northward of Olinda. Should the wind prevent a vessel from lying along shore on the port tack, stand off until midnight or morning, as the wind is then apt to blow at right angles with the shore, which will enable her to gain her port.

If falling in to the southward, about Cape St. Augustin, observe that the land is very remarkable, having ten or twelve cocoa-nut trees on its summit, and reddish banks of sand. There is also a large building amongst the cocoa-nut trees; but the most remarkable objects about this part are some white cliffs, about 3 miles to the northward of the cape. These cliffs are rugged and craggy, and appear like clothes drying at a distance. Olinda will be seen to the N.W.

Should a vessel fall in to the southward of Cape St. Augustin, a large mountain (*Monte Sellada*) will be seen, having the appearance of a saddle, and also two flat mountains, one on each side of the Saddle Mountain, bearing in a westerly direction.

The chapel on an eminence, *N. S. do Rosario*, with its two towers or steeples, between 7 and 8 miles southward of Pernambuco, has been already noticed.

The HARBOUR.—Pilots are generally in waiting to conduct vessels into the port; but should none be ready, get the vessel (if at anchor) under way about 1½ or 2 hours before high water. Should the draught be not more than 16 or 17 ft., the *Small* or *Picao Channel* may be used. The leading mark through is the two South turrets of Fort Bruno in a line, which will lead within 20 yards of the rock lying to the North of the lighthouse; but as this rock is steep-to, a vessel may luff close round it, and keep close to the reef, if the wind permits, until within a cable's length of the lower tier of shipping; then drop the port anchor, and await the orders of the harbour-master or pilots.

Large vessels discharge and load in the channel between the harbour and English Bank, at about three-quarters of a mile to the N.E. of the lighthouse.

Vessels lie moored in Pernambuco with two anchors down, from the side next the town, and also two ropes or chains to the reef. Four vessels generally lie in a tier, and are sheltered by the reef, which is formed by nature, with the exception of a few stones which have been laid down a little above Fort Picao. The water within the harbour is generally smooth, except at the top of high water spring tides, when there is not only a heavy swell, but also a strong current rushing over the reef. In this case, good ropes or chains should be fastened to the reef. This lasts about two hours only at each high water during a few days with spring tides.

On leaving Pernambuco great care should be taken not to stand too near the Olinda Reefs, as there are some detached rocks about the outer edges. The greatest risk of coming in contact with these dangers occurs when leaving the harbour late in the afternoon with a wind which prevents sufficient tacking. In daylight, however, there is little to fear, as the broken water can be seen; but after the first tack night may approach, so that the breakers cannot be seen, and also a strong northerly current, according to the wind, which requires caution. The safest way, in this case, is to keep well to the southward.

The marks for clearing the Olinda Reefs in the daytime are the *Camona*, or highest church in the district of *Santo Antonio*, open to the southward of the lighthouse; or rather, the church with two steeples, lying a little to the North of the other, which leads a vessel more clear of them. By night, do not allow the light to bear any more to the southward than W.S.W. until

Olinda bears N.W. by W., or W.N.W., when a vessel will be at a good distance off shore.

The pilotage in and out of Pernambuco is very expensive, although the pilots have no branch, yet it is customary for strangers to employ them, and even vessels trading to the port seldom refuse them. They are more serviceable in mooring and unmooring the vessel than in the service which they render in coming in or going out. They have generally a good boat's crew, and some of them are very expert in diving to clear away anything that may be foul of the anchor, a circumstance that often occurs; but there is one charge they make, which is for shifting the vessel down from the discharging berth to that of loading, which could be done without their assistance; still they force their service on you, and under particular circumstances a master is induced to take them.

Vessels loading a sugar cargo in Pernambuco should not load deeper than 14½ ft. until they go outside. However, this greatly depends on the wind, for should it be from the S.E. quarter, and a good breeze, there is little danger in going over the bar, when drawing 15 or 16 ft., on the height of spring tides.

On leaving the harbour vessels generally begin to unmoor at half ebb, the tide previous to their going to sea, when they have plenty of time to get all their ropes or chains in, and the vessel winded, deck clear, &c. Should the wind be from the S.E. a good breeze, get under weigh one hour before high water, keep at a proper distance from the reef, and make all sail possible; luff close round the rock that lies to the northward off the lighthouse, and observe whether the trees on Cocoa-nut Island, to the southward, open out to the eastward of the lighthouse; if they do, the rocks that lie to the northward of this channel will be passed to windward, then there is only the Olinda Reef to be regarded; but should the direction of the wind be such that these rocks cannot be weathered, which can easily be seen by the cocoa-nut trees not opening to the eastward of the lighthouse (or of the shipping in the harbour), in this case these rocks must be kept on the starboard hand or passed to leeward, and therefore beat through the wide channel, as before directed.

It is to be observed that all these dangers, being to the northward of the lighthouse, are nearly in a direct line with the main reef, so that when the shipping in the harbour is open to the eastward of the lighthouse, a vessel is then clear of them to the eastward, and, by having them open to the westward, the vessel may run along with safety, passing to leeward of them all. Again, by keeping the shipping in a line with the lighthouse, you would pass on the shallowest part of them.

Should the wind be so that vessels cannot lie along the reef, warping down becomes necessary, and before sail is made they ought to be close down to Fort Picao. Masters, or rather pilots, not taking this precaution, often get to leeward, a circumstance frequently attended with danger, and which is sometimes fatal. This was the case with the brig *Alcides*, which was wrecked in 1832, abreast of Fort Bruno.

When ships are obliged to anchor outside previous to their entering the port, which is generally the case, the masters usually go in with a boat, either to the royal wharf, or else alongside of a visit boat, with one mast and flag, lying inside the reef, a little above the lighthouse. The cargo is generally brought off in boats, or large launches, and attended with very little risk, as the distance is not great, and not much swell. From this advantage and the regular sea-breeze, the wall formed by nature, and its strong guns for mooring posts, that are proof against any accident that may occur, and the healthiness of the climate, this port may be considered one of the safest and best on the Brasilian coast.

II.—PERNAMBUCO TO BAHIA, INCLUSIVE.

CAPE SAO AGOSTINHO, or St. Augustin, 17½ miles southward of Fort Picao, is a high, rugged, and projecting promontory, which may be readily known by its red cliffs, with a church and some houses and cocoa-nut trees on its summit. It has also, on its eastern extremity, a battery, which is difficult to be distinguished. The cape is described by M. Roussin as a hill lightly wooded, of moderate height, declining gradually to the sea; remarkable by the red cliffy spots on the termination of several points, by its arid aspect, and the church on its summit, with the battery to the E.N.E., intended to protect several small anchorages in the vicinity, but which appear to be no longer used.

By giving Cape St. Augustin an offing of 6 or 7 miles when bound to Pernambuco from the southward, and steering a N. by E. course, you will soon gain sight of the city of Olinda ahead. The city stands principally on the southern declivity of a pleasant hill, and when the highest buildings are well in sight, Pernambuco will be discovered to the southward of them, the site being low and sandy.

In the Bay of *Gaibu*, about 2 miles N.W. of Cape Sao Agostinho, there is anchorage for small vessels within musket-shot of the shore, having a passage to it formed by the reefs. Between this and Pernambuco, and along the coast to the southward, several small rivers fall into the sea, having entrances through the reefs.

The total distance from *Pernambuco* to *Cape St. Antonio of Bahia* is 376 miles, and the mean direction is about S.W.

The distance from *Pernambuco* to *Point Maracahipe* is 30 miles, and the trend of the intermediate coast, is S.W. by S. ¾. S.

From *Point Maracahipe* to *Porto Calvo* is 44 miles, and the mean direction of the intermediate coast, S.W. ¾ S.

From *Porto Calvo* to the mouth of the *Rio Sibahuma* the distance is 248 miles, and the intermediate direction, S.W. ¼ W.

From the *Rio Sibahuma* to the *Point of Itapuan*, nearly on the parallel of the little *Mount Massarandupio*, is 47 miles, in a S.W. ½ W. direction.

From the *Point of Itapuan* to *Cape St. Antonio of Bahia*, the distance is 10½ miles, and the mean direction of the coast, W. ¾ S.

From Cape St. Augustin, southward, the coast continues to be fronted by the Recife and other reefs, and without which are gradual soundings to the distance of about 6 miles. In coasting along there may be found, in 15 or 16 fathoms, good anchoring ground, of white sand; the same ground may be found in 8 fathoms; but in a less depth the bottom is generally of rock and shells.

Point Maracahipe, 12 miles to the southward of Cape St. Augustin, is level with the sea, covered with wood, and at a distance appears inundated. When at sea, to the eastward of this point, you will, however, see an inland ridge of high ground, extending North and South, which has a break or dip in the middle, dividing it into two round knolls, and called *Serra Sellada* or *Saddle Hill*, from its resemblance to a saddle. This mountain stands in about lat. 8° 25′, long. 35° 12′, and in all the country hereabout a similar one is not to be seen, nor one so high, all others being level, and covered with low brushwood. When just open to the southward of Cape St. Augustin this mount may be seen bearing about West, and when in a line with Point Maracahipe it bears nearly N.W.

From Cape St. Agostinho to Point Maracahipe, and still farther southward, the land is low, level, and covered with brushwood. The coast has a white sandy beach, bordered with a reef.

Above the Point of Maracahipe is a hermitage, and between Cape St. Augustin and this point are successively the small hamlets of *Cupe* and *Galinhas*; small vessels can anchor in front of the latter by passing through a break in the reef.

West of Santo Aleixo Island, there is good anchorage in 18 or 20 ft. of water, bottom of sand and fine gravel. In approaching the anchorage, you must avoid the reef extending 2 cables West from the North point of the island, and, approaching from the southward, keep about 3 cables to the South of the reef which extends half a mile from the South end of the island, steering to the northward when the S.W. and highest part of the island bears N.E.

The little islet of *Sto. Aleixo*, inhabited, and 70 ft. high, lies in lat. 8° 35′ 49″ S., long. 35° 1′ W., nearly off the entrance of the little river of *Serinhaem*; at 4½ miles to the southward of which is another little river, *Rio Formoso*. To the N.W. of the islet, far inland, may be seen the Serra Sellada, before described; when at several miles to the East of it Cape St. Agostinho may be distinctly seen, as it bears from it N.E. by N. ¾ N., 15½ miles.

Tamandare.—At 8 miles to the S.W. by S. from the islet of Sto. Alexio is the little *Port Tamandaré*. It is against the opening in the reef which forms an anchorage, and which is larger than most of the openings of this nature. The entrance through the reef is 984 yards wide; several shoal spots encumber the entrance, dividing it into two, where there are depths of from 26 to 36 ft. at low water. The port is marked by the village and church near the sea, and South of the village is a fort. To enter the port by the South channel, approach the entrance 1 or 2 miles from the outer edge of the reef, until the buoy lying on the North side of the channel within the entrance is in line with the North end of the fort, bearing N. by W. ½ W.; steer for them on this bearing, so as to pass a few yards West of the buoy, and anchor in 22 ft. of water, the South side of the fort bearing N.N.W., and the end of a little pier on the beach North of it N.E. by N. In this position a vessel is sheltered from all winds except those from S.E. Small vessels may anchor 200 yards South of the end of the pier.

To enter through the East channel, bring the buoy to bear N.W. by W., and steer for it until the outer end of the North reef bears North; from thence steer to the westward until the buoy is open East of the fort, when steer up for the anchorage as before. It is high water, full and change, at 4h 15m; springs rise 10 ft.

The town of Tamandaré is rising in importance, on account of the cotton cultivation. Water can be procured, but not more than 15 tons a day, from a well near the fort. The position of the fort is lat. 8° 43′ 40″ S., long. 35° 6′ W.

The *Caixo de Una* is an opening in the reef, 6½ miles to the southward of Tamandaré. There is good anchorage behind the end of the North reef, in 20 to 25 ft. of water.

The reef from the opening at Caixo de Una extends for 14 miles unbroken to the S.W. by S., where is the *Barra Grande*, an opening 100 yards wide and 23 ft. deep, fronted by a shoal spot of 16 or 18 ft. Its distinguishing mark is the high land of St. Bento, on the South side, and above it the church of St. Bento. The *Serras de Marambaya*, about 25 miles inland, are a conspicuous chain of mountains. Southward of Barra Grande the reef is much broken, and should be carefully avoided, as it is deceptive.

Porto de Pedras, or Calvo, is small, but will admit vessels of 120 tons, and may contain six of that description. The town of Porto Calvo is now a small place with large houses, and a city-like appearance. It suffered much in the rebellions, and contains about 2,000 inhabitants. It still carries on some trade. Along the coast, at a distance of about 1½ mile, is a ledge of reefs, having an interval which constitutes the entrance, and which has a depth of 4½ to 6 fathoms. Within is a depth of 3 and 4 fathoms. Strangers must proceed cautiously with the lead, and will find, when within, that the water is smooth, with bottom of sand.

From Porto Calvo to the *Rio Camaragibe*, 13 miles to the S.W., the land is level, with low brushwood; the reefs 1 to 1½ mile from the coast; the beach of white sand. On the South side of the Camaragibe, stretching along shore, is a range of bare hills, or cliffs of red sand.

Near the river of *St. Antonio Mirim* (or little St. Antonio), 17 miles farther southward, is a range of red cliffs, 1½ mile in length, and three small round hills, which stand on its northern side.

MACEIO.

The *Province of Alagoas* is limited on the North by the River Persinunga, in lat. 8° 55½′ S., and to the South by the River Sao Francisco, having 170 miles of coast line, an area of about 21,000 square miles, and a population in 1875 of 348,000, of which 36,741 were slaves. It is mostly covered by forests and lakes, the latter of which give it its name. It is extremely fertile, exporting principally cotton and sugar; the cotton is the best grown and prepared in Brasil.

Between the Serra Sellada in 8° 25′ S. and the *Serra Forquilla*, commencing in 9° 5′ S., there are no high mountains visible from the offing. The Serra Forquilla extends to 9° 25′ S., where it sends a range off towards the coast. *Serra Barriga*, in lat. 9° 37′ 30″, long. 36° 10′, is the most remarkable; it is 1,300 ft. high, and when viewed from the N.W., 40 or 50 miles distant, appears as a sort of table land, with a conical isolated peak to the South of it.

MACEIO, or Macayo.—The next place of any consequence on this coast is Maceio, or Maçayo, a city or village situate on the western side of a wooded bluff. It is the capital of the province of Alagoas, and stands on the West slope of a hill, 2 miles westward of Point Verde; it is rapidly rising in importance, the population, which was estimated at 20,000 in 1870, having doubled in the previous ten years. There are many new buildings, including a cathedral. The business portion, called *Jaragua*, stretching along the beach S.E. of the town, is also improving, a custom-house and several fine buildings standing near the wharves. Several of the warehouses are extended from the beach on piles, forming convenient jetties for landing and embarking goods.

A steam tramway runs from the iron wharf to Trapiche da Barra on the Lagoa do Norte, a distance of 3 miles; it is mostly used for carrying cotton from the lake steamers to the wharves. A mule tramway runs 4 miles to the suburb of Bebedouro. A railway is proposed from Maceio to Imperatriz, a large town, 53 miles distant in the interior, which would pass through a very rich sugar district.

The exports consist principally of cotton, sugar, and hides; in the year 1879-80, 23,018 tons of sugar, 34,937 bales of cotton, and 11,405 hides were exported. The total value of the exports for the year 1878-9 amounted to £390,964, and the imports, principally provisions and hardware, to £254,538. In 1880, 79 foreign vessels entered this port, with a total tonnage of 28,106, of which 44, with a tonnage of 17,624, were British. The mail steamers, and Brasilian coasting steamers, also call here.

Most of the vessels that come to load at this port are chartered in other ports of Brasil, and come in ballast. When with stone ballast, this is discharged free of expense to the ship, as the stones are required for building purposes, stone being scarce in the neighbourhood of the port.—*Mr. Vice-Consul Wucherer*, 1878.

Supplies in large quantities cannot be had. Oysters of good quality can be brought from the lake, if ordered, and are not expensive; fish is plentiful. Water can be obtained in any quantity from wells, but is of inferior quality. Captain Mouchez says that provisions are 50 per cent. dearer than at Bahia. Dues are heavy, especially when loading sugar. There is no coal, and wood is expensive. The climate of Maceio is warm, but healthy, fever and ague being the only diseases. There is no hospital. It is high water, full and change, at $4^h 30^m$; springs rise 8½ feet.

A Lighthouse stands on the western point of the hill which overhangs the town of Maceio, and shows a *fixed bright* light, varied by a brighter *flash*, of 12 seconds duration, every 2 minutes; the flash is preceded by an eclipse of 16 seconds, and followed by an eclipse of 22 seconds. The light is elevated 208 ft. above the sea, and should be visible in clear weather at a distance of 22 miles.

On approaching Maceio, when at the distance of 12 or 14 miles, the lighthouse can clearly be made out, and also the larger buildings of the town. The land may also be distinguished by a red spot on the face of the cliff, about

5 miles to the S.W., and by a white chapel, with two towers, in the same direction.

Point Verde, lying 24 miles S.W. of the Rio Camarigibe, is salient, but low. It is covered with cocoa-nut trees, and surrounded by rocks, on which the sea breaks heavily. The land northward of it is low and sandy, with a few red cliffs, some of which are very conspicuous. Here the coast turns suddenly westward for 3 miles, forming Paijucara and Maceio Bays.

Paijucara.—At 13 cables W. ½ S. from Point Verde is *Point Jurugua*, low and sandy, with a small village and a fort on it. The shore between these points recedes to the N.W., forming a little bay, protected by the reef to the South, but encumbered with banks and rocky patches. The village of Paijucara, sheltered by cocoa-nut trees, stands on the beach. Small vessels are built here.

Extending in a curve 1¾ mile long, from half a mile off Point Verde to about 7 cables off Point Jurugua, is a ledge of coral rocks, which terminate suddenly at a point S. ½ E., 13½ cables from the lighthouse. A *white* buoy is moored a cable westward of its termination. At half-tide this reef is uncovered, the water breaking heavily upon it at high water.

The main entrance to Paijucara Bay, in which there is shelter during the winter, when Maceio Bay is dangerous, lies 12 cables S.W. by W. from Point Verde, and 6 cables S.E. by S. from Point Jurugua. To enter, steer with the light bearing N. by W. until Point Verde bears about N.E. by E., which leads to the entrance. Steering for 2 or 3 cables to the N.E. through the entrance, you will find anchorage in 4 or 5 fathoms, sheltered from S.E. or S.S.E. winds.

Although the reef is very steep-to, vessels should not approach within 1 or 2 cables of its South and East sides, in consequence of some detached rocks lying off it, one of which, with 15 ft. water over it, lies 1½ cable South of the main entrance to Paijucara Bay, with Point Jurugua bearing N.W. ¾ N. and Point Verde N.E.

The Baixo is a detached rocky bank, 1 cable long and 100 yards wide, lying about half a mile South of the West extremity of the reef. It has 12 to 15 ft. water over it at low water, and breaks heavily at times. From the centre of it, Point Jurugua bears N.E. by N. ½ N. 1 mile distant.

From Point Jurugua the coast curves to the N.W. and West, having on its shores the village of Jurugua, to the South of which is the anchorage of Maceio. On the shore off the village are five wooden piers and one of iron, on the latter of which, lying to the East of the other piers, a small *red* light is generally shown. Only lighters and small vessels can use these piers.

The anchorage of Maceio, named *Porto do Jurugua*, is excellent in the fine season, during the northerly winds, but during the S.W. monsoon it is dangerous and exposed, and anchorage must then be made at a farther distance from shore in 15 or 20 fathoms, with better holding ground. During the year 1868 Captain Mouchez says that five vessels, of which three were lost, drifted ashore in one day; the cause of this being the dragging of their anchors in depths of 4 or 5 fathoms, although the wind was not heavy.

No directions are needed for entering the bay, which is completely open to the South and S.W., only observing to keep a sufficient distance from the reef, and to avoid the Baixo, which is better left to starboard, although there is a good channel North of it. Anchor without the line of mooring buoys belonging to the packet boats, not passing within the line of Points Jurugua and Verde in line, and as near the reef as possible, without endangering the vessel, in order to get all the protection you can, as they form at the best of times but a poor protection from the sea, which sets continually into the bay from the S.E. Vessels always trend stern to westward in this anchorage, so there is no fear of drifting on to the West end of the reefs. A pilot will come off if the usual signal is made, but the fishermen are usually good pilots.

Between Maceio and the River Sao Francisco there exists a number of lakes close to the coast, some of which are navigated by boats which can pass down the rivers to the sea. The principal of these are the *Lagoa do Norte* and the *Lagoa Manguaba*, on the S.W. side of the latter of which is *Alagoas*, the former capital of this province till 1839. It has now a population of about 9,000.

There is not a single port of importance, except to small coasting vessels, between Maceio and Sao Francisco.

Porto Francez is a small anchorage at about 7 miles to the S.W. of Maceio, off the hamlet of *Remedios*, and at the base of the *Point Massaveiro*, forming the South side of a large valley occupied by the Rio das Alagoas, and by the two lakes which give their name to that river. Craft drawing 6 ft. water may enter Porto Francez, the only point of communication from the lakes to the sea. The larger coasters stop in the exterior anchorage for receiving, by the jangadas, the merchandise of the country.

S. Miguel das Alagoas.—The bar of *Sao Miguel das Alagoas* (of the lakes) is the mouth of a small river which comes from the N.W., and on the northern border of which is the little town of *Sta. Anna*, to which the coasters go to take charge of the sugar, cotton, and building-wood produced in the country, and brought from the adjacent heights; several roads for the conveyance of which may be seen. The Bar of S. Miguel admits of very small vessels only.

The coast southward of the Rio de S. Miguel should be approached with great caution, as there are several detached shoals, which lie at from 1 to 1½ mile off shore. Do not come into less than 10 fathoms.

Jiguia, or Jiquia.—At 16 miles to the south-westward of Rio de S. Miguel, in 10° 3′ S., is the Bar of Jiguia. The coast between is about 80 ft. in height, nearly level, and terminating on the sea by several reddish cliffs; the interior, which is woody, presents an agreeable aspect.

The *Bar of Jiguia* is not always navigable for the coasters, and they more frequently anchor outside; but, with high tides, it allows the passage of small craft.

On proceeding southward from Jiguia, you pass the mouth of the little *River Poxim*, on which is the village of *Conceiçao*, and at the distance of 9½ miles thence is the bar of *Coruripe*, or *Cururippe*. A village of the same name stands on a low projecting point, with cocoa-nut trees. At this part the Recife appears at from 1¼ to 2½ miles from the beach. At 1¼ mile outside the reef—that is, at 2¾ miles S.E. ½ S. from the extremity of the point on which Coruripe stands—is a very dangerous cluster of reefs called *Dom Rodrigo*. There is a passage within of 5½ and 6 fathoms, three-quarters of a mile wide, in which a ship might find shelter under the lee of the reefs. At 3½ miles S.W. from this is another shoal, the *Lages de Miahy*, with 22 ft. least water; and at 3 miles beyond, in the same direction, is a 7-ft. shoal, called the *Baixos do Japú*. The two last are 4½ miles off shore. On the other parts of this coast you may approach to the distance of 2 miles, where there is generally from 10 to 13 fathoms water.

The RIO DE SAO FRANCISCO is a broad and rapid river, but shallow, especially at its entrance, which lies in lat. 10° 29′ S., long. 36° 22′ W. It is subject to great inundations in the months between March and September. Small craft only can enter it, partly owing to the rapidity of its stream, and partly to the shoals at its entrance. By Royal Decree this river was opened to ships of all nations to Peñedo, about 25 miles above the bar, on November 7th, 1867.

A Lighthouse stands on the North point, and shows a *fixed bright* light, elevated 69 ft., visible 11 miles off. It is not a very good light, and in 1881 a notice was issued stating that the light apparatus would be removed, as the building was falling into decay.

The intermediate land between the Alagoas and Rio de Sao Francisco is low and sandy; the shore, bordered by the Recife, presenting small openings and inflections. The country near the mouth of the river is well populated, and abounds in sugar-cane, cotton, wood, and tobacco.

The entrance of the river is bordered on the South by *Point Manguinha*, a low flat point, covered with mangroves. It projects to the E.S.E., and heavy breakers extend seaward 1½ mile. The North point, very low, is of quicksand, with vegetation; the coast northward of it is of the same nature, and there are breakers as on the South. The passage is between the breakers, in 9 ft. at low water, and vessels anchor before it in order to engage a pilot, whose assistance is indispensable. On the left bank of this river, about 25 or 30 miles from the bar, is *Penedo*, the most important town, with a population of about 4,000. Coasting steamers ascend as far as Peñedo; the water deepens considerably after crossing the shifting bar, over which vessels drawing 11 ft can pass. It is high water, full and change, at 4^h; springs rise 8 or 9 ft.

Mr. Consul Bonham, in his report for 1879, makes the following observations on this river:—

It appears that there are pilots, but it is not easy for them to get off to vessels, which very frequently have to wait many days outside the bar: in fact, when deeply laden they should only attempt to cross the bar at the full or the new moon tides; sailing vessels can enter without a tug, as the breeze sets on to the land, but it is absolutely necessary for them to be towed out, and there is great difficulty in getting a steamer to do so, vessels having to wait days, frequently several weeks, for one; sometimes the coasting steamers will do it, at others the small river steamer can be obtained, the usual charge is 500 milreis, or £50, which is heavy. After passing the bar the river is very wide, the average width as far as Peñedo being about a mile, but the channel is tortuous and a pilot absolutely necessary. There is another bar in the river, called Baixio, about 7½ miles below Peñedo; there is 8 ft. of water on this bar from about May to October at new moon tides, and 10 ft. at full moon; during the rest of the year the river is generally swollen, and there is from 11 to 12 feet of water. Vessels coming to Peñedo generally discharge part of their cargo before passing the inner bar, and going out have to complete loading when over it.

At Peñedo vessels anchor close to the shore, and there are good warehouses and a tramway between the chief stores, custom-house, and wooden landing jetty. During the first eight months of 1879, besides the Brasilian coasting steamers, 22 foreign and 16 Brasilian sailing vessels arrived; of these vessels, 18 appear to have brought material for the Paulo Affonso Railway. Sugar and cotton are the principal exports.

There are several small towns on the river above Peñedo, both on the left bank in Alagoas, and on the right in the province of Sergipe, and the river is navigable for vessels of small draught up to Piranhas in Alagoas, which is 148 miles from the sea. There is a small steamer which does the trip from Peñedo to Piranhas and back once a week, calling at eight places on the way.

A railway is now in course of construction by the Government from Piranhas to unite the navigable portion of the river below that to the upper waters of the same river beyond the Falls of Paulo Affonso, after which the railway is named; a section of it is to be opened in a few months, but it will be at least two years (1882) before the whole length of about 72 miles is completed; it will probably terminate at Jatoba, about 227 miles from the sea, but still 1,585 miles from the source of this immense river, which beyond Jatoba is said to be navigable for light draught vessels for some considerable distance.

The Rio de Sao Francisco rises on the eastern slope of the Serra da Canastra, the great central platform of Minas Geraes, about 240 miles to the W.N.W. of Rio Janeiro; it is one of the largest rivers in Brasil, and is described as navigable in the greatest part of its course. It extends from the South to the North, in nearly a parallel direction with the coast; but, traversing a flat country to the approaches of its mouth, it loses both depth and strength. It has been excellently surveyed throughout its course by order of the enterprising Emperor of Brasil, and a fine Atlas of its course has been published by the government.*

"To reach the vast interior provinces of Brasil through the navigation of the River Sao Francisco, is the desideratum aimed at by the three principal ports Rio de Janeiro, Pernambuco, and Bahia. The former is surrounded, and shut in by lofty mountains of from 4,000 to 6,000 ft., and has not hitherto succeeded in finding an easy outlet for its railroads into the interior to reach the Sao Francisco through the province of Minas Geraes. The second has a long way to go before she can reach that river, of the margins of which she only possesses a few leagues. But Bahia has been destined by nature, and the topographical features of her territory, to become mistress in time of that internal traffic, and moreover possesses 500 miles of that splendid internal artery of the empire on both margins of her territory."—*Mr. Morgan*, H.B.M. Consul, Bahia (1859).

At 6 miles to the W. by S. from the mouth of the Rio de Sao Francisco may be seen a small opening on the shore, called by the country people *Barra*

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* In that most interesting and exhaustive work, "Explorations of the Highlands of Brasil," by Captain Richard F. Burton, F.R.G.S., &c., 2 vols., 1869, is given a lengthened account of the river, its geography, geology, history, and its commercial importance, to which the reader is referred. See vol. i, chap. xv, pages 214—287.

Nova. There is a discharge from the river during the wet season, but even then it is not navigable.

From the Rio de Sao Francisco to the S.W. the coast continues to be very low; but we now come in sight of the great inland mountains *Pacatuba* and *Itabayanna;* the latter being to the West in about 10° 50′ S., and its highest summit is stated to be in lat. 10° 47′ 10″ S. long. 37° 23′ W.

Here it becomes dangerous to approach too near the shore, as with a strong south-easterly wind it would be difficult to gain an offing. The beach is flat, and the bottom near it is of stiff sand, in which the anchors hold firmly; but this should not induce a vessel to come too near. At the distance of between 3 and 12 miles from land the depth increases to 26 fathoms, with the exception of a spot 6 miles to the South of the Rio de Sao Francisco, where 36 fathoms has been found.

The *Province of Sergipe* is divided from Alagoas by the Sao Francisco River, and from thence has a sea-coast of 80 or 90 miles to the Rio Real, its southern boundary. It has an area of 10,000 square miles, and had a population of 176,243 in 1875. Its conquest and colonization were commenced in 1590. Having less natural advantages for commerce, this province has not made the same progress as the other maritime captaincies. Along its coast there are no capes, islands, or good ports. Its rivers have bars which are generally more or less dangerous, and afford little shelter, except to small vessels. The surface of the province is generally flat, there being scarcely a hill or mountain of any considerable elevation. The eastern part yields sugar and tobacco, and the western part is chiefly devoted to rearing cattle. A few *aldeias* on the Rio de Sao Francisco, its northern boundary, are the most cultivated spots. In the eastern part four settlements have been named towns, besides Sergipe, or St. Christovao, which, being the capital, ranks a city. It is situated on an elevation near the River Paramopama, an arm of the Vazabarris, 18 miles from the sea. None of the rivers are navigable for large vessels, and the entrances of all are dangerous.

The **RIVER COTINGUIBA, or COTINDIBA,** winds far up into the country between the mountains. At a short distance within its entrance it receives the waters of several smaller rivers; it is much frequented by the coasters for the products of the country, such as sugar, cotton, tobacco, &c.

Light.—From an octagonal stone tower, 117 ft. high, on Point Miseria, the South point of entrance, a *fixed* light is shown at 115 ft. above the sea. It shows *red* to East and North, *bright* from East to S.E., and pale *green* South of S.E. In clear weather it is seen 6 to 9 miles off.

Aracaju.—The town of Aracaju, principally occupied by coloured people, is on the left bank of the river, about 4 or 5 miles from the bar, and is the capital of the Province of Sergipe; it has a population of about 5,000. The custom-house is established here, off which foreign vessels anchor in 3½ or 4 fathoms of water, sand and mud, well protected from the currents. *Maroim*, about 15 miles above Aracaju, is the chief seat of trade, and where the principal merchants and consuls reside. Steamers make frequent passages between these towns. In 1879, besides vessels of other nations, 15 British vessels visited this port; the value of the exports for that year, consisting of sugar, cotton, and hides, amounted to about £262,500, of which about £242,000 represented sugar. There is no direct import trade to this province; the

Brasilian coasting steamers call here. Good water may be procured here, also fresh beef and vegetables.

The bar of Cotinguiba River is in about lat. 10° 58′ S., and vessels making the port should keep well to the North or South of the bar, according to the prevailing wind and current. Vessels may close with the land until within soundings of 5 or 6 fathoms, when they will be 2 to 3 miles from the bar; and they should then hoist a signal at the fore for a pilot, who will proceed on board as soon as the tide turns to the ebb.

When the signal-tower is in sight from the ship, the signals should be observed, as they are intended for a guide to vessels entering the port; and of their purport the following is an explanation :—

1st. The upper flag hoisted alone is the signal that the vessel is seen from the shore.

2nd. The lower flag, which is hoisted upon a moveable staff, denotes that the vessel should tack, either to the North or to the South, as indicated by the direction of the sloping flagstaff.

3rd. Both flags being hoisted on the central flagstaff, one above the other, signifies that the vessel is in the right position off the bar, and that the tide is favourable for entering. The vessel should then steer direct for the signal-post on the beach, and the signals will remain flying even after the vessel has passed the bar.

4th. If either one or both of the flags be hoisted and lowered again, it implies that the ship should stand off.

If the master of a ship has never been in the port before, he should not attempt to enter without a pilot, and should avail himself of the telegraph only in case of absolute necessity.

Long before the signal-tower is visible, there is a chain of mountains that may be seen in clear weather. It is named La Itabayanna, and is so denominated in the English charts. Its southernmost point is named, from its similarity in shape, the Cardinal's Hat, and bears from the bar W. by N. ½ N.

In coming from the northward, there may be seen a distant and solitary hill, named Aracaju, at the entrance of the river, which, when the vessel is about 2 or 3 miles E.S.E. of the bar, bears N.W. by W. ½ W.

In coming from the southward, the bearings will be nearly the same, but great care must be taken not to enter the River Vazabarris, where the signals are very similar, and which is only 14 or 15 miles to the S.W. of the Cotinguiba Bar. The bearing of the Cardinal's Hat from the Vazabarris is N.W. ½ N., and the Aracaju is not visible.

A large *red buoy* is moored in 9 fathoms, about a mile outside the Cotinguiba Bar, and distant 4 to 5 miles S.E. ¾ S. from the lighthouse. Vessels becalmed, or waiting for a pilot, may temporarily secure to the buoy.

There is good anchorage to the North of the bar, in 6 or 7 fathoms, hard, firm sand; but vessels should, if possible, always remain under weigh, and though they make the port too late for the pilot to come off that night, still they should hoist the signal at the fore, and stand out to sea, keeping well to the northward, where they will be sure to meet the pilot outside in the morning.

At night, with the red light in sight, vessels may anchor in 4 fathoms of water; but with the green or bright light in sight, do not get into less than 5 or 6 fathoms, sand and mud. Vessels of 12 or 13 ft. may cross the bar at springs. There is a steam-tug, with which a vessel, drawing 15 ft., has crossed, but vessels of 11 ft. draught and under enter the port with less loss of time.

Captain Mouchez says that the entrance runs N.E. and S.W., but is liable to change. You enter with the signal-tower in line with the northernmost of two small hills, situated a few miles in the interior.

Vazabarris, or *River of Sergipe*, called by the natives *Irapirang*, is 14 miles S.W. from that of the Cotinguiba. When advancing to this place from the East or the South, you may see three small hills, of equal size, covered with bushes, situate about 9 miles to the S.W. of the entrance, and which are named *Os Tres Irmaos*, or the *Three Brothers*. The town of Sergipe, built at the foot of these hills, on a conflux of this river, has given its name to the stream.

On the South point of the entrance of this river, in among the trees which cover the point, is a signal-tower, having some resemblance to the one at Cotinguiba; from it signals are shown similar to those previously described for Cotinguiba. It is dangerous for vessels to approach the bar, as the sand-banks project 3½ or 4 miles from the point, which sometimes breaks.

The mouth of the river is formed on the South by a long point of white sand, and is, as well as the North point, encompassed by violent breakers, which render an entrance into it very difficult. Under the most favourable circumstances the channel has only 10 or 12 ft. of water.

In the bay formed by the coast between the Rio de Sao Francisco and the Rio de Sergipe, the sea, in all seasons, rolls violently inward; and more particularly when the wind sets in upon the coast. Many ships have been lost here; and, as it is so dangerous, all who pass should keep off to a sufficient distance.

Rio Real.*—The mouth of the Rio Real is 21 miles S.W. from that of Vazabarris. This river proceeds, in a long course, from the interior, and inland is divided into many branches. As seen from the offing, the mouth presents nothing remarkable but the breakers on each side. A strong current sets outward from the river.

On the North point of the entrance a signal-mast is placed. The entrance of the river lies S.S.E. and N.N.W. from this mast; the bar is very difficult, and nearly always breaks. As in the two preceding rivers, there is 9 hours ebb and two of flood in this river. The exterior anchorage is 2½ miles South of the entrance, with the mast bearing between N.N.E. and North, in 4½ or 5 fathoms.

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* The PROVINCE OF BAHIA, including the old captaincy *dos Ilheos*, extends from the Belmonte to the Rio Real, which divides it from Sergipe del Rey, being about 300 miles in length. On the West and N.W. it is separated by the Rio de Sao Francisco from Pernambuco; while on the S.W. it bounds on Minas Geraes. It is divided, like Pernambuco, into the comarcas of Bahia, Ilheos, and Jacobina, the former two comprising the coast, and the latter the western part of the province.

In the General Assembly of May, 1873, at Rio de Janeiro, a project for the creation of a new province, under the name of SAO FRANCISCO, passed the Chamber of Deputies, to be formed by the dismemberment of the departments lying on the northern and southern sides of the River Sao Francisco, belonging to Bahia, of two others taken from Pernambuco, and two from Minas Geraes, having for its capital the city of Villa da Barra, situated on the banks of that river. This measure is one of great utility, and will be advantageous to the populations lying so far inland in respect to the administration of justice and towards its civilization; but its commerce must, as at present, continue with Bahia as the nearest mart for its produce, and from whence its supplies must be furnished.

The southern point, called *Mango Secco*, is an extension of a beach of white sand, called by the pilots the *Prancha*, or Plank of Rio Real. Within the bar the river turns to the S.W., and afterward receives a number of others. From sea, at about 2 miles off, are seen a number of huts in the environs of the bar; over the latter there is said to be only 15 ft. of water, with high tides, but vessels drawing 8 ft. can enter under the worst circumstances, and reach the port of *Abbadia*, a few miles up. The swell is heavy, and the passage always dangerous, and to be attempted only by the boats and pilots of the country.

All the coast extending from the Rio de Sao Francisco to the Rio Real is low, sandy, partly covered with bushes, and variegated with little woody hills. The ground without the Recife, or line of rock, is generally clean, and between 2 and 10 miles off the depths are from 9 to 30 fathoms, bottom of oaze, sand, and broken madrepores. The last quality of bottom is generally the farthest from shore.

Itapicuru.—At 19 miles S.W. from the Bar of the Rio Real is that of the Itapicuru, which is of less consequence, only admitting vessels of 5 ft. draught and under. According to the pilots, it has only 7 or 8 ft. over it with high tide, and is obstructed by breakers, which render an access dangerous; no distinguishing marks being seen from the offing. On bringing it to the West, the opening may be seen between downs on the right and left, and there is a hamlet on the South side at some distance within the entrance. The only vessels which enter are the decked boats and jangadas or rafts of the country, which are insubmersible.

From the *Bar of the Itapicuru* the coast trends in a more southerly direction to and beyond the parallel of 12°. A series of small hills, called the *Oiteros de San Miguel*, borders the coast, commencing at 6 or 7 miles from the Bar of the Itapicuru. Nothing remarkable is seen on the coast for a distance of nearly 60 miles, except the little mount *Massarandupio*, in 12° 24′ S., eastward of which several rivulets fall into the sea. Along the greater part of the coast are the reefs, and a strand of white sand.

Conde is a small village on the right bank of the entrance of the River Inhambupe, in lat. 12° 12′ S. Capt. Mouchez says that he saw generally one or two vessels lying off here, and loading from the jangadas.

In lat. 12° 33½′ is the tower of *Garcia da Vila*, or *de Avila*, the most remarkable object of this part of the coast, on the North side of a small river, which vessels drawing 8 ft. can enter; it is a sort of fort, on the rising land, situate among trees, and having a signal-post. A rock is reported as lying off the Point Torre d'Avila, and vessels should not approach this point within 2 miles. The depths increase quickly off shore, and at 10 miles off there is no bottom at 40 fathoms. In lat. 12° 30′ no bottom is to be found at 60 fathoms, 8 miles off.

From the tower of Garcia da Vila the coast trends S.W. ¼ W. to the point of *Itapuan*, a distance of 32 miles, and presents nothing but sandy downs, varied only by bushes and cocoa-nut trees. The Recife, or border of rocks, continues all the way, and many are always above water, appearing like islets.

POINT ITAPUAN LIGHTHOUSE.—At Point Itapuan the coast turns suddenly from its S.W. direction to W. by S. On it is a clump of cocoa-nut trees and the village of Itapuan. This point is bordered by rocks showing above water, on one of which, a cable from the shore, called *Piraboca Rock*, is situated the lighthouse, a round iron tower, painted red. It shows a *fixed bright* light, elevated 68 ft., and visible 14 miles off in clear weather. Lat. 12° 57′ 30″ S., long. 38° 20′ 48″ W.

On the meridian of Point Itapuan you find depths of 10 fathoms within a mile of the coast, and no bottom with 100 fathoms, 7 miles off. In a small cove near the lighthouse small craft can find shelter from N.E. and S.E. winds.

From Itapuan Point the coast forms a curve for 9 miles to *Itapuazinho Point*, marked by a grove of cocoa-nut trees, and between, the two small rivers *Jaguare* and *Cachoeira* enter the sea. At Itapuazinho Point the coast turns suddenly to the W. by N. for 4 miles to Point St. Antonio; at about 1 mile from the former is *Point Vermelho*, a cliffy point, on which is a *Signal Station* for reporting vessels. Point Vermelho is high, the coast eastward of it being low, with some whalers' establishments on it. Just to the westward of it the small river *Vermelho* enters the sea at the bottom of a small bay, and westward of this the coast, which is safe to approach, is wooded and hilly, with some handsome country houses of the inhabitants of Bahia on it. Between Itapuan and Itapuazinho Points the current sets directly on shore; at the latter point the tidal current is felt.

The Baron Roussin says, that on all the extent of coast between the parallels of 10° and 13°, we have found that the winds of the northern monsoon have daily variations, a knowledge of which is useful to those bound northward. During the night the land-breeze ceases; but this is seldom felt beyond the reefs. On the approach of day, however, the breeze freshens and blends with the winds of the offing, which seem attracted by the North coast toward noon; after this hour the wind becomes more easterly, so as to make an angle of about two points of the compass between that of the morning and that of the evening. It follows that the borders are affected by these varieties, of which advantage may be taken.

BAHIA DE TODOS OS SANTOS.

SAN ANTONIO POINT and LIGHT.—From the N.E. San Antonio Point has the appearance of a peninsula nearly separated from the main land; it is nearly entirely occupied by the buildings of an old fort, on which is the lighthouse, which shows, at 140 ft. above the sea, a *revolving* light, alternately twice *bright* and once *red*, every 80 seconds, taking four minutes to complete a revolution. It is visible 18 miles off in clear weather. This light is badly placed, and would have been better on Point Itapuazinho, as it is obscured by land to vessels approaching from the northward when North of the bearing of W. by N. ½ N. However, the light off Itapuan Point will serve as a good guide till San Antonio light is sighted. The coast here may be approached within 2 or 3 cables, as the Recife terminates here. Vessels entering by the passage North of the San Antonio Bank must take care to avoid its northernmost shallow patch of 3 fathoms, lying nearly a mile S. by E. from the light.

BAHIA.—Bahia de Todos os Santos, the Bay of All Saints, was discovered in 1503 by Americus Vespucius, under the patronage of the King of Portugal, Don Manoel. Vespucius carried home from the coast of Santa Cruz, as the newly-discovered country was first called by the Portuguese, a cargo of *ibiripitanga*, the dye-wood, which, when cut in pieces, resembled *brazas*, coals of fire, from which circumstance it acquired the name of Brasil-wood, and also conferred a name on the country.

In 1510, a vessel, under the command of Diego Alvares Correa, was wrecked near the entrance of this bay. The Tupinambas, a ferocious tribe inhabiting the coast, fell upon and destroyed all who survived the shipwreck, save the captain of the vessel, Diego, whom they spared, as some supposed, on account of his activity in assisting them to save articles from the wreck. Bahia owes to this event its foundation, and its being long the capital of Brasil.

The entrance of the Bay of All Saints is formed, on the West, by the Island Itaporica, and on the East by the peninsula on which stands the City of St. Salvador, or of Bahia. Within it the land forms an extensive gulf or inland sea, bearing the name of *Reconcavo*, and which receives the waters of several large rivers. The entrance of the bay is 4¾ miles wide, and the gulf within more than 96 miles in circumference. Here fleets, riding on clear ground, may be sheltered from every wind, and surrounded by a country exuberantly rich, in a gulf which seems as if formed by nature for the emporium of the universe.

As a place of call for vessels in want of repairs or supplies of any kind, Bahia is very convenient; it is healthy, and easy of ingress and egress, without the aid of a pilot; nor does there appear to be any difficulty in vessels getting to the southward from this port, on account of the tendency of the winds from that direction from March to September, as they generally draw well to the eastward, and more so when farther to the southward.

The best anchorage is opposite the town of Bahia. The town consists of two parts, the Praya, or Cidade Baxa, and Cidade Alta, which has the aspect of an old city. The lower town, the Praya, is built on a narrow strip of land at the foot of a perpendicular cliff of from 200 to 240 ft. elevation, and, with the exception of some good houses on the quays, the place is pre-eminently foul and disagreeable; it has, however, been slightly improved of late years, and is lighted with gas. It is shut out from the sea-breeze by the cliffs above it, and in the afternoon the heat is almost insupportable. Nevertheless, yellow fever was unknown till 1850. The Praya (beach) is one street, nearly 4 miles long, and contains the magazines and warehouses for inland produce and foreign goods. At its southern extremity are the arsenal and the royal docks, and about 3 miles N.E. of it, at Tapagipe, are the ship-yards in which mercantile vessels are built, and also a patent slip. A steep and very difficult ascent leads to the Cidade Alta, and there is now an elevator for the conveyance of passengers and freight between the two cities. The upper town consists of stone houses, from three to five stories high, and of good appearance. In the centre are several squares, surrounded principally by public buildings. The cathedral, the Jesuits' old college (now a hospital), and numerous churches, are the chief public buildings in the upper town. There is hospital accommodation free of charge for foreign seamen.

The custom-house and wharves are on the beach. Near the dockyard are the marine storehouses and offices, with the house of the superintendent, or port commander.

The Bahia and San Francisco Railway, having its terminus in the lower town, runs for 70 miles into the interior to Alagonhas, and is now being extended for 202 miles farther to the town of Villa Nova da Rainha, and thence for 88 miles to Joazeiro, through the cotton-growing district of the Sao Francisco River. On the opposite side of the bay the Central Railway has a branch line from Cachoeira to Fiera de St. Anna; and 45 miles of the main line to the diamond mines is now completed. A line is also being constructed between St. Amaro and Bom Jardim, a distance of about 20 miles. All these lines traverse rich and productive country, and should greatly increase the importance of this port.

There are two street railways, one in the lower town, running to Bom Fim and the repairing yards at Tapagipe, 3 or 4 miles to the northward, and another from the upper town to San Antonio Point.

Steam communication with native and foreign ports is frequent and increasing. There are four English mail steamers and one French to Europe each month, besides two or three freight steamers, which also carry mails. Bahia is also in direct telegraphic communication with Europe, and the principal ports on the East coast of South America.

The official census of 1861 gave the population of Bahia thus:—Whites (Brasilians or Portuguese), 40,000; Mulattos, 51,000; native Negroes, 33,000; Africans, 25,000; Foreigners, 3,000; total, 152,000. In 1875 the population of the Province amounted to 1,379,616.

The principal export commerce of Bahia consists in tobacco, sugar, coffee, diamonds, hides, and cocoa, the value of which as exported in the year 1878-9 amounted to £1,443,600; the imports, consisting principally of cotton and iron goods, and provisions, amounted to the value of £1,676,125 for the same year; Great Britain doing about half the trade on both sides. This shows a great falling off of trade as compared with previous years, on account of bad seasons and a disease of the sugar-cane. In 1879, exclusive of other nations, and coasting vessels, 84 British sailing ships with a total tonnage of 27,723, and 156 steamers with a tonnage of 384,464, entered Bahia.

The town and shipping are protected by a number of forts and batteries. The first is that on Cape San Antonio, a small antique fort, surmounted by the light-tower. A little bay and sandy beach within are defended by a small fort called *Fort Cabo*, or *Santa Maria*, and the circular battery of *St. Diego*. At the S.W. extremity of the city, that leads to the sea, are *Forts Gamboa* and *San Pedro*. Passing these, the dockyard is defended by the high bulwark battery of St. Philip. There are three other insignificant batteries on the inhabited part of the beach, and a small one on the projecting point more to the North, called Montserrat. On the land side the city is defended by three forts, &c. The principal defence, however, is the *Fort do Mar*, which was erected about the year 1600, on a small rocky bank of the inner bay, about one-quarter of a mile from the shore. On it a ***fixed red*** light is shown, its position being lat. 12° 58′ 16″ S., long. 38° 30′ 38″ W., Villegagnon Fort, Rio Janeiro, being in 43° 9′ W.

It is high water at the Fort do Mar, on full and change, at $4^h\ 25^m$; springs rise 8 ft., neaps only 3 ft. The tides are perfectly regular. At the anchorage before the town the flood and ebb are equal, and their direction is alternately N.N.W. and S.S.E.; their strength, under ordinary circumstances, does not exceed 1½ mile in the hour, but spring tides sometimes run as much as 2½ miles.

The Fort do Mar, otherwise called *Fort San Marcello*, repeats the signals of all vessels entering the port, which are first made at Fort San Antonio. They are announced by a gun, with a tri-coloured jack for large vessels, a red one for brigs, and white for smacks.

At about a mile from the city is the suburb of *Vittoria*, where Captain Sabine made his observations in 1822, and which he stated to be in lat. 12° 59′ 22″, on a sandstone cliff, which descends abruptly about 200 ft. to the sea. The great road by the coast to Pernambuco, and generally toward the northward, passes through the village.

Iaguaripe, Amoro Jacobina, Do Sitio, and Sao Francisco, are all bustling towns of the province. The country in general is cultivated inland to a considerable distance, and is divided into extensive plantations.

Climate.—The year is divided by the inhabitants into two seasons, winter and summer. In the former, which lasts from March till August, the thermometer in the harbour averages about 76°; in the summer or dry season it is about 86°. In the roads the winds vary between N.E. and S.E. during 9 months of the year; squalls, with thunder and lightning, with S.W. and N.W. winds, being experienced at times during June, July, and August. The winds are pretty regular during the fine season, commencing in the morning from North to N.E., with a calm from about 9 to 11, followed by the sea breeze from S.E. to E.S.E., which lasts till sunset, when another calm ensues, followed by irregular light winds during the night.

Water can be obtained; it is procured in large casks, and brought alongside in lighters. The lightermen are supposed to pump the water on board; should they demur about doing so, it is best to tell them at once to do so, or leave the vessel, which will have the desired effect. The customary price is about 3,000 reis per ton. Vessels may also obtain water by sending their own boats to the watering place at Fort Gamboa, to the fountain of Mininos, North of the arsenal, or to Tapagipe Bay, where they also have to pay a small sum, and it is a questionable saving.

Fresh provisions are plentiful, but increase about one third in price on the days when steamers are expected. *Coal* is to be had in any quantity; in 1870 it averaged about 60*s.* a ton. Wood is plentiful, but expensive. This port is becoming a rival of Rio for the repair and equipment of vessels.

SAILING DIRECTIONS for BAHIA.—The *landfall* of Bahia depends upon the direction from which a vessel approaches it, and the prevailing wind at the time. When the wind is well established in the N.E. quadrant, and whatever its direction when coming from the northward, the best landfall is in the vicinity of Point Itapuan, known by its lighthouse. Approaching the land during the day on or about this parallel, it is first seen 20 to 25 miles, of medium height, and slightly undulating; a nearer approach will bring in view the white sand downs, interspersed with clumps of bushes, and here and there a few scattered cocoa-nut and other trees. Vessels coming from the northward should close with the shore about Point Itapuazinho to within one-quarter or half a mile; and after passing the flagstaff on Point Vermelho, San Antonio Point and lighthouse will be first seen 2½ miles farther West.

On account of the prevailing currents it is also advised that between March and September the best landfall is the Morro San Paulo, and during the other months the coast should be made about 10 miles northward of Itapuan Point.

When approaching from the South during southerly winds, the best landfall is the Morro San Paolo, presently described.

During the night vessels will know their position by bearings of Itapuan light, for San Antonio light is not visible until it bears North of W. by N. ½ N.; the depth of water is such that the hand lead will not give soundings until within 2 or 3 miles of the shore, and in some places within 1 mile. It has been found that the current invariably sets to the north-westward, *directly on shore*, until abreast of Point Itapuazinho, where the tidal current is felt; therefore, a vessel running parallel to the salient points near the land should make allowance for the current. During spring tides the allowance should be made for the set of the tidal current, after passing Itapuan, in order to avoid being carried beyond the limit of visibility of the San Antonio light when the tide is ebbing, or being forced close to the land with a scant wind when it is running flood.

San Antonio Bank, of very irregular shape, is nearly 4 miles long North and South, and in some parts 1 mile wide. The North end is marked by a *red* buoy, moored in 21 ft. at low water, 8 cables S. by E. ½ E. from the lighthouse. The South end is marked by a *red* buoy, moored in 25 ft. at low water, 4½ miles S. ½ W. from the lighthouse. These buoys must not be depended upon. The depth of water on this bank varies from 3¾ to 5 fathoms, except in four spots, where the least water at low tide is 2¼ to 3 fathoms, over red sand and coral. Vessels of less than 15 ft. draught may cross over this bank when the wind is light and the sea smooth; but during fresh winds, or a heavy swell, the waves comb, and the sea is short and dangerous throughout its whole extent.

On August 11th, 1876, the S.S. *Germania* struck on a hitherto unknown sunken rock, with 9 ft. over it at low water, 2½ cables N.W. by W. from Cape San Antonio lighthouse. The wreck was marked by a small *red* buoy.

The North Channel is between the North end of San Antonio Bank and the shore. It is half a mile wide, and 4½ to 9 fathoms deep. To enter through this channel, bring the lighthouse on any bearing between N.W. by W. ½ W. and N.W. by N. ½ N., and steer for it between these bearings until within 2 or 3 cables of the shore or fort. From thence to the anchorage, if the wind is scant, keep about the same distance from the shore, and haul up gradually, keeping in not less than 5½ fathoms water, until Fort do Mar is open of Fort Santa Maria, taking care to avoid Germania Rock by not passing eastward of the line of Fort do Mar bearing N.E. ¾ N.; then luff to the wind, and hug the shore, making half boards in preference to tacking, so as to take advantage of the flaws, which are invariably from the eastward close under the land. When abreast of the church and Point of Na. Sa. da Victoria, if close under the land, the distance from the shore should be gradually increased, so as to pass to the westward of the *Gamboa Rock* and *Shoal*. The outer edge of this is marked by a large *red* buoy, moored in 2 fathoms water, 3 cables N.W. by N. of Fort Gamboa, and 8½ cables S.W. from Fort do Mar.

This channel is the best and simplest at all times, and particularly when the wind is to the northward of East, for then vessels beating up from the southward can make better headway outside than they can between San Antonio Bank and the Island of Itaporica; they are also to windward of the anchorage as much as it is possible to be when following close under San Antonio and the projections to the northward.

The South Channel is 8 miles wide between the South end of San Antonio Bank and the 5-fathoms limit of soundings bordering the shore of Itaporica Island. From thence northward it becomes narrower until abreast of San Antonio Point, where it is 2½ miles wide between the 5-fathoms limit of soundings on each side. The South end of San Antonio Bank is well marked by a range of two hills, one on Itaporica Island, named Morro Conceiçao, 295 ft. high; and the other on San Amaro Island, named Morro San Amaro, 492 ft. high. These two hills in line, bearing N.W. by W., lead clear of the South end of the bank. Having entered this channel with a fair wind (and it is to be presumed that no one would beat through it in preference to beating up in the open sea), the best route is with Montserrat Point open of San Antonio Point, and steer for the former on any bearing between N.N.E. and N.E. ½ N. The least depth of water in this channel is 9 fathoms.

In working, a vessel should not stand farther eastward than to bring the church of Bomfim, on Montserrat Point, in line with the projections on which Forts Santa Maria and Diego are built; nor to the westward nearer than 2½ miles from the shore of Itaporica Island, after passing the parallel of San Antonio lighthouse. Inside of this channel a vessel can stand to the eastward until the soundings diminish to 8 fathoms; and to the westward, when South of San Antonio lighthouse, until they diminish to 6 fathoms. Beyond these limits of depth the bottom is foul. After passing the parallel of San Antonio lighthouse, the soundings near to the Baixo Grande are very irregular and deceptive; the utmost caution is necessary when beating through at night.

The Baixo Grande is a shoal that borders the shore of Itaporica Island from the parallel of San Antonio lighthouse as far as Jaburu Point, the East extremity of the island. The depth of water close to it varies from 5½ to 14 fathoms, and there is no range of prominent marks that can be given as the West limit of this channel. During the day the position can be ascertained by cross bearings of the highest peak of Itaporica Island and Montserrat Point; but during the night there is no reliable mark, unless under very favourable circumstances the fixed *red* light on Fort do Mar can be distinguished. It should be seen 5 miles, if the light were a good one; but this is not the case, and it has been found difficult to distinguish it from the various lights in the vicinity, experience having proved that it cannot be made out with certainty until abreast of Gamboa.

There are three other dangers to be avoided when approaching the anchorages of Bahia; the first of these is the Gamboa, or Ciudad Bank, which skirts the shore in front of the city from N'a. S'a da Victoria as far as Montserrat Point. The outer edge of this bank is marked by the red buoy, before described. To the westward of this the ground is clear.

Panella Bank is a plateau of rocks, covering a circular space of about half a mile in diameter, on which the soundings vary from 16 ft. to 9 fathoms. This bank is marked by a *red* iron buoy in 20 ft. at low water, three-quarters of a mile W. by N. ¾ N. from Fort do Mar, and a *red* iron buoy in 24 ft. of water, 1 mile (? 1¼) W. by N. ¼ N. from Fort do Mar. A vessel must not pass between the buoys; the channel is between the fort and the eastern buoy. There is good anchorage all around this bank in 5 to 7 fathoms, but when near to it the lead should be examined to ascertain the nature of the bottom, so as to avoid anchoring on the rocks.

The other danger is a bank formed by the wreck of a large French packet, that was burned in 1856, and sunk in 4 fathoms of water half a mile N.E. by N. ½ N. from Fort do Mar.

Anchorage.—*The Franquia* is the anchorage for vessels of war, vessels with powder on board, and all other vessels, until permitted to proceed up to the anchorage North of Fort do Mar. The space between Forts do Mar and Gamboa is occupied by the Brasilian government vessels, one of which is kept in commission, and anchored abreast of the buoy marking Gamboa Rock. The Franquia is South of this vessel, and none are allowed to pass her without permission from the authorities. At night the guard-ship, as she is called, shows a *bright flashing* light from a lantern hung at the peak, and all vessels arriving between sunset and sunrise must come-to South of this light. This light is seen as soon as it is open of San Antonio Point, when coming through the North channel; and, as long as it is exhibited, it is an excellent mark to steer for at night, in order to avoid Gamboa Rock.

The anchorage of merchant vessels, after having been boarded and permitted to proceed, is North of Fort do Mar. On the North side of this anchorage there is a series of moorings belonging to the steam-packet companies. Sailing vessels are not allowed within the limit of these moorings. This anchorage is perfectly secure at all seasons of the year. The only winds that give some annoyance are the N.W. squalls, which blow for an hour or two during the months of June, July, and August; but they rarely have strength sufficient to necessitate veering cable, or letting go another anchor. All vessels lying in these roads are required to moor, and it is customary to have an open hawse to the E.S.E., because the tides run from N.N.E. and S.S.W. and the prevailing wind is easterly. Anchors should be buoyed so as to prevent later arrivals fouling the moorings.

During the rainy season, when the winds are from the southward, the Franquia is not always as smooth as is desirable, although the sea is never rough enough to be dangerous to boats.

The Landing for man-of-war boats is at the arsenal, inside of a slip, the opening to which is easily found, situated South of the custom-house mole. North of this the wharves extend well up the shore, and there are numerous landing-places, the best and most frequented of which is the first one after passing the custom-house pier.

Repairs.—Vessels needing extensive repairs, or such as make it necessary to be in a perfectly sheltered port, can find every facility in the Harbour of *Tapagipe*, North of Montserrat Point.

The timber of the country, used in the construction and repairs of wooden vessels, is of the best quality, and resembles teak in toughness and durability. Its great fault is that the sap contains an acid, which causes the rapid corrosion of iron bolts. These should be used only where copper and wooden plugs are not obtainable, or out of place. The great drawback to repairing vessels is the scarcity of skilled labour, and the enormous wages demanded by the mechanics.

Besides this ship-yard there are three other foundries and machine-shops. The best of them is at Montserrat Point; and they have every facility for making and repairing machinery of all kinds and sizes. Attached to the foundry there is a slip, in which vessels of under 350 tons can be taken out of water, and repairs made at any stage of the tide. The firm was about to import a steam-hammer, and were making preparations to build an ordinary floating dock, with capacity for lifting the largest vessels (1870). The workmen are chiefly Europeans, and the work turned out is considered perfectly satisfactory.

The Arsenal is not such as might be expected in the second city of so large an empire, but answers the purpose required of storing supplies, and furnishing the means of repairing vessels of war to a limited extent.

Directions for Leaving.—Bound to sea, vessels have no difficulty in standing out through the South channel during the early morning; and, by waiting for the sea breeze, they may work out without difficulty. When the wind is from the southward of S.S.E., the North channel should be used, for then it can be cleared without a tack.

Tugs may be had by vessels bound in or out by making a signal, but the demand is so small that the charges are exorbitant.

III.—COAST AND HARBOURS FROM BAHIA TO THE ABROLHOS.

ITAPORICA ISLAND, forming the West boundary of the Bay of All Saints, is about 15 miles long N.N.E. and S.S.W. by 4 to 5 miles wide. The East coast is bordered by reefs, before described. When navigating near this coast the lighthouses of San Antonio and Sao Paolo are in sight, and afford good marks. They bear N.E. by E. and S.W. by W., distant 31 miles apart, and it is recommended not to pass to the N.W. of their line of bearing, for inside of this line the coast is foul, and particularly off the South end of Itaporica. Should the weather prevent the land or lights being seen, the lead should be kept constantly going, and the vessel hauled off shore when the depth is less than 9 or 10 fathoms, for inside of this limit the depth decreases rapidly.

The principal port of the island is *San Gonçalo*, on the N.W. shore. This is much frequented by the small coasters, which carry on a thriving trade with San Salvador, most of the fruit and vegetables consumed in the city being grown on this island. The population of the island is about 18,000 or 20,000, there being many good houses on its eastern side.

Barra Falsa, or Barra Jaguaripe.—Itaporica Island is separated from the main land by a channel of irregular depth and dimensions, which is frequented by small coasters that are bound to Bahia from the southward. The entrance to this channel, marked by a *red* buoy, is between Points Caixa Pregos, the South end of the island, and Garcia of the main land. It is called Barra Jaguaripe, on account of its also being the entrance to the river of this name, and will admit craft drawing 6 ft. Some charts designate this entrance as Barra Falsa, which is wrong; for the little bay formed by Points Aratuba and Caixa Pregos to the East of Barra Jaguaripe is the true Barra Falsa. This indentation of the shore, seen at a distance of 12 to 14 miles, has all the appearance of Point San Antonio. Like it, it appears separated from the coast that is seen to the westward, and it is this circumstance which has given it the name of Barra Falsa. The channels of Jaguaripe are difficult and dangerous, owing to the heavy sea that is driven in by the prevailing wind, and the many outlying reefs which border the shore.

Jaguaripe River is navigable for 20 to 25 miles from the mouth for small craft. From the entrance to this river, as far as the Morro St. Paolo, the coast is low, sandy, and bordered with reefs. It should not be approached nearer than 3 miles. At 7 miles W.S.W. of the Jaguaripe there is a break in the coast; this is the entrance to the *Jequiriça River*, which is navigable by small vessels 10 or 12 miles from the mouth. About midway between that and Sao Paolo is the village of Cural.

Morro Sao Paolo Lighthouse, situated 31 miles S.W. by W. from San Antonio Point, is at the North end of Tinharè Island, and on the East side of the entrance to the Rio Una. A chain of hillocks extends S.S.W. and N.N.E. along Tinharé Island, and terminates abruptly, at the North point, in some reddish and wooded cliffs, which form the point designated as the Morro Sao Paolo, at the foot of which is the fort. The lighthouse, 80 ft. high, and painted white, is situated on the summit of the point, and shows a *revolving bright* light; the flash lasts 15 seconds, followed by an eclipse of 45 seconds. At less than 9 miles the eclipses are not complete, and during the interval between the flashes a faint light is visible. The light is 275 ft. above the sea, and should be seen in clear weather 20 miles. The N.E. and East shores of the point are bordered by reefs extending 2 to 3 cables out, which are dry at low water; there are several passes between these reefs, used by the fishermen. At three-quarters of a mile S.E. by S. of the point a chain of reefs commences; these border the coast to the southward, and are known as the Coétés or Cahetes Reefs; they are steep-to, with 10 to 11 fathoms close to their seaward edges.

River Una.—The entrance to the River Una is between the Morro Sao Paolo and the sand-banks bordering the shore of the main land. In this entrance there is a perfectly sheltered anchorage for vessels of any draught. Vessels bound in should bring the lighthouse on any bearing between W. by N. and S.W. by W., and then steer for it a little open of the port bow. When within 2 or 3 cables of the point, haul gradually round to the southward, keeping about this distance off, and anchor when abreast of the first sand-beach South of the lighthouse, with the lighthouse bearing East, one-half or three-quarters of a mile distant, in 8 fathoms water. Vessels intending to make a long stay should proceed farther down the harbour, which turns abruptly to the westward abreast of the village of Gamboa.

The fishing village of *Morro* extends across the North part of the island, just to the South of the lighthouse; landing can be made at the West side of the village. *Gamboa*, a smaller village than Morro, lies nearly 2 miles S.W. ¾ W. from the lighthouse, at the bottom of the bay; here vessels proceeding to the town of *Valença*, on the left bank of the river, 6 or 7 miles from the lighthouse, call for a pilot. Valença contains about 5,000 inhabitants; it has been much extended of late years by the introduction of a cotton factory, saw mills, and iron foundry.

From the Morro Sao Paolo the land declines in height to the southward, and at a distance of 6 miles is *Crapoa Point*, low, and covered with dark green vegetation, by which it can be recognised; at 2 miles South of the point is a village of the same name, that can be seen when coasting along near the land.

South of the village the land still declines in height, and is wooded as far as Boypeba Island; the shoal water, of 2¼ fathoms, and many coral patches, prevent a nearer approach than 3 miles. The land between the Morro and Boypeba is that of *Tinharé Island*, separated from the main land by a deep channel, which connects the Rio Jiquié and Rio Una; two small and unimportant rivers here run into the sea. The delta of the Rio Jiquié forms two other islands, named Tupiassu and Boypeba.

Boypeba Island, 6 miles long, is well marked, and easy to recognize, by a group of wooded hillocks, much higher than the coast of Tinharé and the main land to the southward, both of which are seen in the background. It is cultivated, and carries on a small trade with Bahia.

Barra Carvalhos.—From the South point of Boypeba Island the shore trends to the westward, and forms a right angle with that of the main land. At their junction, 4 or 5 miles West of Point Castellanos, is the entrance to the channel, which separates the island from the coast; it is also the entrance to the *Jiquié River*, called the Barra Carvalhos, practicable only for small coasters of about 6 ft. draught. Its approaches are encumbered with coral banks, to avoid which the services of a good pilot are necessary.

Between Boypeba and Camamu the coast is 4 or 5 miles westward of the line joining Points Castellanos and Muta, thus forming a gulf or bay, encumbered with reefs and shoals, which terminate at Quiepe Island. The shore is low and sandy, without a mark of any kind.

The Port of Camamu is the best on this part of the coast, Bahia excepted, on account of its depth, extent, and the perfectly sheltered anchorage. The entrance is narrow, and formed by the Sororo-cussu Reefs on the North, and Point Muta on the South.

In approaching the coast on the parallel of 13° 50′ S., there is no high land to mark the entrance to Camamu; but when about 15 miles from the land the Island of Quiepe will be seen, 160 ft. high, having the appearance of a double clump of bushes; and the low Point Muta, marked by a group of cocoa-nut trees. Quiepe Island is surrounded by a number of coral patches, which extend 2 miles to the eastward and 1 mile to the southward.

There is a dangerous rock, called the *Sioba Rock*, nearly uncovered at low water, situated 3¼ cables S.W. by W. ½ W. from the end of Point Muta, and nearly on the line joining it to Point Pedreira.

Enseada de Campinho is the name given to the anchorage westward of Point Muta and N.W. of Barra Grande village; the depth in it varies from

10 ft. to 6 fathoms. Before anchoring, care should be taken to avoid dropping the anchor on a rocky bottom. To the West and N.W. are several rocks and rocky banks.

Camamu Town is situated on the left or North bank of the Acarahi or Camamu River, 10 miles from the sea. It was founded in 1561. At present it is carrying on an active trade with Bahia, and exports lumber, coffee, rice, cocoa, farina, &c., &c. It is high water, full and change, at Port Camamu, at 4^h; springs rise about 6 feet.

Directions.—When bound to Camamu from the northward, keep at least 2 or 3 miles to the eastward of the meridian of Castellanos Point until on the parallel of Quiepe Island, and in not less than 8 or 9 fathoms depth. About this distance off, bring the city of Camamu (which stands on an elevation, and is readily distinguished) in line with Pedreira Point, bearing W.S.W., and steer for them on this bearing; this course will lead through mid-channel half a mile northward of Point Muta, and about the same distance South of the Sororo-cussu and Pragonas Reefs. Lieut. Bax, H.M.S. *Sharpshooter*, reported in 1867, that a bar of 4 fathoms had formed across the entrance to this port.

The coast between Camamu and Contas is low, sandy, and covered at intervals with patches of vegetation and groups of cocoa-nut trees. It is clear of danger. The land in the interior is a little elevated, but offers no conspicuous mark, except the summit of a small chain of hillocks, called the Serra Canastra, 10 miles from the sea. This coast is called the "Terra Algodon." The only opening is the *Barra Marahu*, in lat. 14° 10′, which is used, under favourable circumstances, by small coasters bound to Camamu.

Contas.—The mouth of the *Rio Contas* may be seen from the offing. The land on its South side is high, and covered with trees; and, on nearing the coast, a small town will be seen. The South point, *Cape Tromba Grande*, is a high perpendicular line of black rocks, 328 ft. high, the transition between the low plains to the North and the high lands southward of it. Contas church is in lat. 14° 17′ 40′ S., long. 38° 59′ W.

The narrow channel, in which there is a depth of 8 ft. at low water, and 14½ ft. at high water, passes close to the South side, and is easy to enter with a smooth sea. Contas is the chief place of this district, which is said to be the most fertile on the coast, and is frequented by large coasting vessels and steamers, who often put in for refreshments. There is anchorage off the entrance with the cape bearing S. ½ W., distant 2 miles, in 8 or 9 fathoms. Pilots are always at hand.

From the Contas the coast trends to S. by W. for 30 miles. All along it is perfectly clean, and large ships may proceed along it at the distance of 2 miles. The line of coast is only broken by several small creeks or mouths of rivulets.

The *Serra Grande of Contas* is a chain of mountains trending perpendicular to the coast line. Three or four of the highest peaks are 1,640 ft. high, and are visible 40 miles off. The East slope of these mountains terminates abruptly in some places, and forms a series of cliffs extending along 10 miles of the coast. The northern point of these cliffs is situated 9 miles S.S.W. from Cape Tromba.

SAO JORGE DOS ILHEOS.—The Fort of St. George dos Ilheos is situate on the South side of the bay of the same name, 31 miles S. by W. ¼ W. from Contas, and appears like a part of the little town which is the capital of the province. Two remarkable islets lie off the mouth of the river, at a short distance to the N.N.E., and form, with the coast, a shelter for the coasters. A range of detached reefs extends thence to the southward, athwart the mouth of the river, the southernmost being the *Sororoca Reef*, which does not always break, between which and the *Morro Pernambuco*, is the southern entrance to the outer anchorage, used with southerly winds. Vessels proceeding to the river with northerly winds, round the northernmost islet, *Ilheo Grande*, off the western side of which they may anchor in 6 fathoms. The isles at a distance appear in the shape of cardinals' hats; one is covered with trees, and the other is bare, and frequently covered with breakers.

The *Rio Ilheos* is large, but divided inland into many small branches, and is only navigable for 6 miles above St. George. This place may be recognised from sea, by the Morros of Matriz and Pernambuco, which form the entrance to the river, also on nearing it by a large white church at the town. The town of St. George, immediately on entering the river, may be seen on the North side. On the bar there is a depth of about 10 ft. at low water. The North point of the entrance is a high land, called *Focinho de Cao*, or *Dog's Nose*, at the base of which are some rocks, over which the sea runs in breakers. The only trade here is in timber.

The latitude of the Ilheo Grande is 14° 46′ S. At 3 miles to the East of it the depth is 18 fathoms, bottom of oaze.

Southward of Ilheos there are few remarkable points, and none of interest to the sailor. *Olivinca*, lat. 14° 58′, is a small Indian village, built in a picturesque situation, with a church on the summit of the hill. At 3 miles South of it is the mouth of the *Rio Una*, a small stream marked by breakers, admitting vessels of 6 ft. draught, under the guidance of pilots. At 12 miles southward of the Una is the mouth of the *Rio Messo*, 2 miles northward of which are some woody cliffs, 80 to 100 ft. high, with a small triangular white spot very remarkable from the offing. The *Rio Commandatuba*, 15 miles southward of the Messo, can only be entered by vessels drawing 6 ft. and under, and then only in fine weather, at high water, and under the care of pilots. The German colony of *Monitz* was established on its banks, but has been abandoned. At 8 miles southward is the bar of the *Rio Pozim*, which will admit vessels drawing 8 ft.; pilots are at hand.

The *Barra de Canavieras*, in lat. 15° 41′, is the mouth of the *Rio Pardo*, or *Patype*. The surrounding country is very low, but this river is readily known by a white wooden tower on the North point of the entrance, which is clearly seen against the dark verdure. The river is much frequented by coasters, and has 15 or 16 ft. on the bar at high water. The town of Canavieras is situated on the left bank, about 2 miles from the bar, which can be crossed by vessels drawing 8 feet.

Belmonte.—At the distance of 62 miles South from the Fort of St. George dos Ilheos is the mouth of the *Rio Grande de Belmonte*, the entrance to which may be known by the town of *Belmonte*, a modern settlement on the South point of the river; the entrance is marked by heavy breakers on the shore to the right and left. The river is said to be one of the second order of the interior of Brasil, but will only admit vessels drawing 8 ft. and under, over the bar.

The province of Porto Seguro is bounded on the North by this river, which divides it from that of the Ilheos.

Notwithstanding the extent of this river, and the large volume of water it discharges, the bar has never more than 7½ or 8½ ft. at the highest tides, and is barely navigable, being liable to frequent change. The small coasters which enter are guided across by a pilot stationed on the inside, who, from a boat, waves a flag to the right or left for "starboard" or "port," and holds it upright for "steady." The muddy waters of the river extend some distance to sea, and beyond their general limit there are often seen spots of discoloured reddish water, the result of the strong currents and mud from its banks. Anchorage will be found off the bar, in 7 fathoms, with the village bearing about W. by S.

This town is of little importance at present, but will become one of the great seaports of Brasil, if ever the bar is deepened sufficiently to allow of safe navigation. It is built on an elevation in the midst of a grove of cocoa-nut trees, and contains about 800 inhabitants, most of whom are Indian fishermen.

The coast to the northward of Belmonte is straight, bold-to, and uniformly woody, and may be approached with safety. At from 1 to 5 miles from shore there is found from 7 to 20 fathoms of water, over a bottom where oaze and broken madrepores predominate. At about 30 miles to the North of Belmonte are the southern boundaries of the *Serras da Itaraca*, a group of mountains terminating the low lands which extend to the North from *Mount Pascoal*, or *Pascal*. The southernmost of this group are the *Morros de Commandatuba*, 1,900 ft.; they are visible at 36 miles from the coast. Beyond the parallel of these mountains the shore, variegated by hills, covered with trees and small cultivated valleys, presents a very pleasing aspect, onward or northward to Bahia.

From Belmonte, or the mouth of the Rio Grande, to *Porto Seguro*, in lat. 16° 26′ 50″, the coast trends S.S.W. 36 miles. It is bordered nearly to the distance of 3 miles off with sand-banks and shoals, several of which are uncovered at low water, and dangerous to approach without a pilot. The banks are separated by the openings before *Santa Cruz*, *Coroa Vermelha*, or *Bay of Cabral*, adjoining, and *San Antonio*. At 6 miles S.S.W. of Belmonte there is a group of trees on the coast, which are clearly distinguished in the offing.

Araripe Reefs, commencing in lat. 16° 7′, are the first coral banks which indicate the northern limits of the Abrolhos Banks. The reef itself is a large drying coral patch, surrounded by others of the description called here *Chapeiroens*. They extend 3½ miles off Point San Antonio, and continue to the South as far as the Bay of Santa Cruz, for 9 miles, and beyond the latter harbour. To avoid them, do not come nearer the coast than 4 miles, or in less than 13 or 14 fathoms. The low shore affords no marks.

Bahia Santa Cruz and Bahia Cabralia.—This bay, which is 7 miles long, and 2 miles broad, is protected by a line of reefs parallel with the coast, and is, next to Camamu, the best anchorage on the coast between Bahia and Rio Ilheos. It has, however, been so little frequented that it remained nearly unknown until it was surveyed by Captain Mouchez, in 1861. It is an excellent harbour, and vessels drawing from 10 to 12 ft. water can enter the river at high water. It possesses, besides, some historic celebrity; for here Pedro Alvarez Cabral landed on April 24, 1500, two days after the discovery of Brasil, giving the name Porto Seguro to it, since transferred to the bay to the South. Five different reefs lie within the extreme points of the bay, leaving five entrances, all safe but the northern one. At 1½ mile S.E. by E. ¾ E. from *Vermelha Point*, the South point of the bay, is *Ina Rock*, of 10 ft., which seldom breaks. The coast is moderately high, and in the centre of the bay is a remarkable depression, through which the river passes; on the North end of the southern hill is the white church, with a red roof, of the village of Santa Cruz, the best land-mark. It is in lat. 16° 17′ 20″ S., long. 39° 1′ 41″ W. On the North hill is a large isolated tree.

Ships coming here from the North can make the Morros de Commandatuba; if from the South, a good landfall is Mount Pascual, and the high, red cliffs of Porto Seguro. When on the parallel of Santa Cruz, the opening in the hills above mentioned may be seen 15 or 18 miles off, and on nearing the church a large tree will be made out. If the weather be clear, two small hills, *Os Irmaos*, 18 or 20 miles to the W.N.W. of the port, will be seen. As soon as you are certain of your position, and the church bears W.N.W. 5 or 6 miles, run in W.N.W. toward the village itself, and it will lead through the best channel in 8 or 10 fathoms, muddy bottom, and to the northward of a buoy on the Vermelha Bank. Then steer for the anchorage off the river, or in the Bay of Cabral. The sea is never heavy in Santa Cruz Bay, even with S.E. winds, but the anchorage in Cabral Bay is excellent; vessels should anchor in the former bay when the wind is from North to East. The trade of this place is of little importance.

It is high water, full and change, at $3^h 40^m$; springs rise about 6 ft.

PORTO SEGURO, 9 miles S.S.W. of Santa Cruz, is formed by a reef or ledge of rocks that extend from the South point of the river for about three-quarters of a mile in a direction parallel with the land, forming a natural mole. These rocks are dry at low water, and terminate abruptly, appearing again faintly at the distance of half a mile; the space between is the entrance or bar of the harbour, over which there is a depth of 20 ft. with high tides, but the depth within shoalens to 12 ft. The last may be considered as the average depth of the port. The bottom is of fine sand, gradually ascending to a broad beach. The reef to the northward extends for upwards of 4 miles from the coast, leaving a narrow and winding channel leading to Porto Seguro, and only used by small steamers with good pilots.

On entering, the view of the country is delightful. Near the water's edge is a range of fishermen's cottages, shaded with waving cocoa-nut trees in front, and each having its adjoining orange ground. To the northward the land rises to a steep hill, which is ascended by a winding road, leading to the town, which stands upon its summit. The road is remarkable by its reddish colour, by which it may be known on advancing from the offing. The streets of the town are sufficiently broad and straight, but irregularly disposed. The houses are generally of one story, low, and ill built. The churches, of which there are two, are, as usual in Brasil, the best buildings in the place.

On the banks of the river, below the town, stands a village of the same extent, containing about 400 cabins or cottages, and 3,000 inhabitants, including slaves and Indians. These people are employed solely in the fishery about the isles and rocks called the Abrolhos. The principal fish—the garupa—is a large one, of the salmon species, which is salted for the Bahia market. Notwithstanding the fertility of the adjacent country, it is difficult to procure vegetables and fruit.

The small river which falls into the port has only 14½ ft. over the bar at high water, and within 17 ft., so that it cannot receive large vessels. Several banks, besides, extend to the offing, and it is dangerous to attempt to enter without a pilot. At 6 miles distant there is 10 fathoms of water. When the church at Porto Seguro bears northward of W. by N., it may be steered for, and will lead to the anchorage, which is in 5½ to 6½ fathoms, good holding ground, with the church bearing W.N.W., and the red cliffs S.S.W.

Southward of Porto Seguro the coast trends to S. by W. ½ W., and at the distance of 2½ miles is the chapel of *Nossa Senhora da Judea*. It is very elevated, and its white walls, in contrast with the trees beyond it, form an excellent seamark. Here a series of wooded hills commences, showing conspicuous red cliffs, 140 to 160 ft. in height, known as the *Barreiras do Porto Seguro*, extending for 3 miles to the small shallow bay of *Trancoso*. Here are several plantations, and the country appears delightful. At 7 miles farther southward is *Rio do Frade* (River of the Father), the mouth of which has a dangerous bar, admitting craft drawing 8 ft.

The coast to the southward of Rio Frade runs S.S.W. for 4 miles to *Cape Joacema* or *Insuacome*, remarkable by two or three white scarped cliffs, the first of the kind seen in coming from the North. Two reefs lie southward of the cape, but within these reefs the shore is clear of danger, and there is good anchorage for small vessels, and better than that of Porto Seguro, being well sheltered from all winds. At 3 miles southward of Cape Joacema is the entrance to the *Rio Cramimuan*, 6 ft. deep at high water. Vessels drawing 14 ft. will find shelter at the anchorages of Iacomo (Joacema) and Carminaon (Cramimuan).

MONTE PASCAL, or Mount Pascoal, in about lat. 16° 53′ 20″ S., long. 39° 24′ W., rears its circular white head to the height of 1,758 ft., and is conspicuous to a great distance, serving as a pilot mark in the dangerous navigation to the Rio Caravelhas; for all along the coast hereabout is an assemblage of reefs, sunken rocks, and shallows; yet the neighbouring pilots conduct vessels so skilfully through, that few accidents happen.

Mount Pascal was the first land seen on the coast of Brasil by Cabral, on April 21st, 1500. It is the first remarkable mountain which is presented to view from the sea on approaching from the southward; it makes part of a group of hills, extending nearly in a S.E. and N.W. direction, whereof the southernmost presents, at its northern extremity, a *piton* in form of a large square tower, which cannot be mistaken.

When seen from the East, Mount Pascal appears rounded and slightly conical; at 15 miles from shore it may easily be recognised from its elevation, and the heights surrounding it, which may be seen afar off.

La Marne Bank.—Off this part of the coast the bank of soundings has not been entirely explored. On June 11th, 1865, the French man-of-war *La Marne*, when about 60 miles from land, at $6\frac{1}{2}^{h}$ a.m., observed an apparent change in the colour of the water, soon after which some seaweed was passed. At $7^{h}\ 20^{m}$, soundings were got in 28 fathoms, coral and gravel. About $8^{h}\ 30^{m}$

the sea resumed its usual colour; *La Marne*, therefore, crossed over a bank about 12 miles long N.N.E. and S.S.W. *true*. The soundings were found to be in lat. 16° 12′ S., long. 37° 55′ W., and a cast of 190 fathoms, no bottom, was afterwards had in lat. 16° 41′ S., and 38° 23′ W. (Monte Video Artillery Ground, 56° 14′ W.)

The ITACOLOMI REEFS, an irregular assemblage of rocks and sandy banks, of which several are uncovered at low water, extend in a North and South direction, 7 miles, and 4½ miles broad, the outer edge being 5 to 6 miles from the coast, and steep-to. From the North extremity of the bank, Mount Pascal bears W. ½ S.; at the South end it bears W. by N. ½ N. At their outer N.E. point the white cliffs of Cape Joacema bear N.W. By keeping to the distance of 10 to 13 miles from the coast you will avoid all danger, and have from 10 to 20 fathoms of water. At 16 miles more to the East there is 80 fathoms.

As you advance to the land, North of the parallel of Mount Pascal, you may approach it to the distance of 3 miles, where the depths are from 10 to 22 fathoms, on a great part of the coast northward.

In proportion as you approach Porto Seguro, on coming from the South, the cliffs appear more red, and the woods with which they are crowned have an admixture of cocoa-nut trees, which tree is seldom seen more to the South. In proceeding along, you pass successively before the entrances (hardly visible 4 miles off) of the Cramimuan, Josima, Frados, the little Bay of Trancoso, and the chapel of N. S. da Judea, an excellent mark for Porto Seguro.

Point Carunbao, in lat. 16° 52′, is extremely low and bare, being the delta of some small streams. It lies facing the middle of the Itacolomi Reefs, which it approaches so closely as only to leave a channel 100 yards broad, with 3 to 5 fathoms, but which is only fit for small steamers, well piloted. There is good shelter to the South of the point inside the reefs, for vessels drawing 12 ft. and under.

From Point Corunbao the land trends to the S.W., and then S. by W., to *Comoxatiba*, in lat. 17° 6′ 23″ S.; the coast being formed of alternate sandy beaches and red cliffs, and a chain of detached reefs lying 2 to 3 miles off it. Comoxatiba is a small harbour, formed by a break in the reefs bordering the coast, half a mile in diameter, which would afford good shelter to a few vessels of 12 ft. draught. Near it are the ruins of the old village of Columbiana. To the South of this commences a line of remarkable red cliffs, 200 to 260 ft. high. They continue to within 2½ miles of Prado, and are an excellent landmark. They are fronted by an uninterrupted line of reefs.

Prado, a town containing about 1,000 inhabitants, on the parallel of 17° 19′ 20″ S., stands to the North of the entrance of the little *River Jucurucu*, which forms an opening very apparent among the trees, with which the coast is covered. You may approach this embouchure to the distance of 3 miles, and have from 9 to 13 fathoms of water, bottom of sand and oaze; and this depth continues, along shore, as far as 3 miles to the North of Comoxatiba. The country is fertile, and wood and salt-fish are exported. Vessels drawing 8 ft. can cross the bar, and pilots may be had.

Prado Reef, a small bank of coral and sand, which uncovers at low water, lies 3 miles East of the Barra do Prado. There is a clear channel inside it. At 3 miles S.S.E. of it is *Guaratibas Reef*, somewhat larger, with a sand-bank which stretches for 3 miles to the southward of it. There is a 10-ft. channel inside it.

Timbebas Reef properly forms a part of the Abrolhos Group, but it is more convenient to describe it here. It is considered to be the most dangerous of all the reefs, because there are no marks to clear it on the low, uniform coast. The centre of the reef is 12 miles E.N.E. from the village of Alcobaça, and 13 miles E.S.E. from the Barra do Prado. When Mount Pascal can be seen, it bears N.W. by N. ¾ N. from its centre. The coral patches in the centre dry at low water. The sounding lead is of little use in indicating its neighbourhood. It extends for 3 miles in a N.W. and S.E. direction, with its outer edge 12 miles from the shore.

The *Coast* to the southward of Prado trends to S. ½ E., and at about 6 miles from it is the low point of Guaratibas; 6 miles farther is Alcobaça; and 10 miles beyond this is *Ponta Balea*. There are a few points remarkable on this uniform and low coast. The chief are the large clump of trees at the Barra do Prado; the *Fincudo*, a large and remarkable round tree, in lat. 17° 35′, and the tree on the North side of the Rio Caravelhas, in lat. 17° 43′.

Alcobaça, an Indian village, is in lat. 17° 32′. The mouth of the little river *Itanhem* is 2 miles to the South of it. To the South of it an extensive sand-bank bars all access to the coast as far as Balea Point.

Balea, or *Baleine* (Whale), *Point*, lat. 17° 41′, is low and wooded. It forms the North point of the Rio Caravelhas, and off it the sand-bank extends for 4 miles. A flagstaff for signals, and two red-roofed houses, stand on the point.

ABROLHOS ROCKS.—Off this part of the coast lie the formerly-dreaded Abrolhos Rocks (Abrolhos, i.e. " open your eyes," Portuguese), and their numerous reefs. They were all partially surveyed by Admiral Roussin, but were more completely examined by Capt. Mouchez, in 1861. From the ignorance of their character and extent, and the danger in approaching them, they were generally avoided, but this was a serious inconvenience to the growing trade of the Brasilians; therefore, the later survey has done very much service in removing this uncertainty, and also by showing that they afford good shelter to vessels in case of need, when about midway between Bahia and Rio Janeiro.

The Abrolhos consist of five or six groups of coral reefs, which stand on the bank of soundings, and reach to 40 miles off shore. All these reefs rise perpendicularly from a nearly uniform depth of 11 to 12 fathoms. The coral patches are more crowded on the centre than on the outside of the reefs. The outer edges being so steep, render them extremely dangerous.

The depth is frequently greater close up to the edges of the coral than farther off. They uncover about 18 inches to 3 feet at low water. The outer masses of coral are called *Chapeiroens*, a Portuguese name for a large hat, but they rather resemble mushrooms, from their summits being much larger than their bases. The coral formations themselves are of surpassing beauty, and resemble the most elegant plants and flowers.

The Abrolhos, or Santa Barbara Islets, are five in number, and are 30 miles distant, and out of sight of land. *Santa Barbara*, on which is the lighthouse, is the chief; it is 1,600 yards long, and 350 yards broad, and has several hillocks 100 to 130 ft. high. Near its West point is *Redonda*, 131 ft. high.

with a 13-ft. channel between. To the South of this, and connected by a reef, is *Seriba*, 80 ft. high, on the West point of which is the only shrub on the group, a seriba, from which it is named.

A small islet or rock, *Guarita*, lies northward of the East end of Santa Barbara. *S.E. Isle* is one-third of a mile long, and narrow, lying a mile South of the principal islet. Between them is the anchorage in northerly winds.

Innumerable sea birds cover the islets with their nests and eggs, but none of these birds are fit to eat. Turtle at times have been found, but not so frequently as the solitude of the place would lead us to suppose. Sea salt, perfectly crystallized, is found in several places, and a small quantity of fresh water filters down to the base at the North point of the northern islet after rains.

The LIGHTHOUSE, the chief distinguishing object on the Abrolhos, stands on the East end of the island of Santa Barbara, on its highest part. It is a circular iron tower, 51 ft. high, and painted white, surrounded by a dwelling, and surmounted by a bronze lantern. The light is a *revolving bright* light, attaining its greatest brilliancy every *minute*, elevated 189 ft. above the sea, and visible in clear weather at the distance of 17 miles. The *flash* lasts 11 seconds, but within 7 miles a faint continuous light is seen; when within 3 miles westward of Redonda Islet, the light is obscured for a small sector by the summit of that islet. The position of the eastern summit of the island, as given in the notice, is lat. 17° 57′ 42″ S., long. 38° 41′ 30″ W.

Anchorage.—The four islets form a small basin of 5 or 6 cables in diameter, with 7 to 10 fathoms, sand and broken coral, and good holding ground, with the lighthouse bearing N.E., half a mile distant. It is perfectly sheltered, except from winds between South and W.S.W. When these blow, the anchorage to the North of the lighthouse island may be taken, with the lighthouse bearing S.E. by S. ½ S. about 6 cables distant, in 7½ fathoms, fine sand and shells. It should be remembered that around each islet the coral reefs extend some distance, especially on their West sides.

The Parcel das Abrolhos lies outside the islets, and is the easternmost of the group. It is a coral bank, nearly 9 miles in extent North and South, and from 2½ to 3 miles broad. Abreast about the centre of the inner face is the cluster of the Abrolhos Islets; between them is a narrow channel, in which are several shallow banks. The Parcel is composed of coral patches, of small extent, quite perpendicular, and which neither show nor break, except towards the centre of the reef. It is possible, in a well-managed steamer, in fine weather, and with the sun astern, to thread a passage over the bank between the detached masses of coral; but were it not for the lighthouse, its neighbourhood would be most dangerous at night.

The Parcel das Paredes lies to the N.W. of the islets, and forms the West side of the Abrolhos Channel. The Parcel das Paredes (or wall-reef) is of an irregular rectangular form, 15 miles long N. by E. and S. by W., and 6½ to 9 miles broad. It is surrounded in all directions by detached coral patches and chapeiroens, except in the North, where there is a remarkable peculiarity, for here it terminates in a bank of coral, raised 3 or 4 ft. above low water, and which has 8 to 10 fathoms close up to it. This part is called *Pedra Lixa* (seal rock). To the S.E. of the Pedra Lixa, and connected with it, are some large patches which dry, and are called Pedras Grandes; they form the S.E. face of the Parcel das Paredes, so called because it is wall-sided. From the North end of the Paredes [illegible] the land may be seen, and the leading points before mentioned distinguished from the mast-head.

To the S.W. by S. of the Parcel das Paredes is a line of smaller reefs, called the *[illegible]*, *[illegible]*, and the *[illegible]*, which have narrow but clear channels between each.

In the channel between the Paredes and the coast, or rather the sand-banks off Ponta [illegible], the depth increases regularly toward the western face of the Paredes, so that it is only necessary to avoid the [illegible] which border the inner reef, in keeping in depths above 6 or 7 fathoms, which are found in mid-channel. In the southern part of the channel the depth increases to 10 or 11 fathoms, and this will indicate when you are clear of the reefs.

To the South and S.W. of the Paredes are four other coral groups. The nearest to the westward is that of Sebastiao Gomes, 1 mile in diameter. It is on the West side of the S.E. channel, 7½ miles distant from the southern edge of the Paredes. A good mark for this S.E. channel is a bearing of the double group of the cocoa-nut trees of *[illegible]*. They stand on the shore, about 2 miles southward from the S.W. entrance of the Rio Caravellas.

Coroa Vermelha Reef, 3½ miles S.W. by W. from that of Sebastiao Gomes, and 5 miles off shore, is thus named because it has a red sandy islet, about 3 ft. above high water, on its South point. There were a few shrubs on it, and a post, which served as a signal. The reef extends about 2 miles North of the islet, and almost entirely uncovers at low water. There is good anchorage between it and Sebastiao Gomes.

Villa Viçosa Reef is a line of drying coral patches, 3½ miles long N.W. and S.E., and 1½ mile S.W. from Coroa Vermelha. Its N.W. point lies about 6 miles from the mouth of the Rio Peruhipe, called the Barra da Viçosa. There is good anchorage between all these reefs and the shore.

Poppa Verde, the last of the Abrolhos group, lies 16 miles W. ¾ S. from the lighthouse islet, and 4 miles South of the Paredes. It never uncovers, and is but little known by the local pilots. Capt. Mouchez had much difficulty in finding and examining it. It is very small, and apparently has not less than 16 ft. water on it.

All these coral reefs are to be avoided by the eye. They form large greenish-yellow patches, very plain when the sea is calm, and with the sun behind you, especially when viewed from aloft. The sea being remarkably clear, the coral growth can be readily seen in 6 or 8 fathoms water.

The ABROLHOS CHANNEL.—*Steam-vessels*, under all circumstances, will find advantages in going inside the islets, through the Abrolhos Channel. The same with sailing-vessels, with favourable wind, and having sighted the islets or the light. The distance is shorter, and the sea much quieter, for it is a remarkable fact that these coral reefs, rising perpendicularly from the bottom, have a much greater effect in stilling the swell than is found to arise from the sloping beaches of ordinary banks. Besides this, as the channel is now so well surveyed, the lighthouse so efficient as a mark, and the passage quite free from danger, there is no anxiety in passing the Parcel das Abrolhos, which lies outside the lighthouse islet.

Vessels coming from the *northward*, and making for the Abrolhos, will see

Mount Pascal to the S.W. or W.S.W., when in about lat. 16° 40′. This will certify the position of the ship. Being some miles to the eastward of the meridian of the islets, and in lats. 17° 15′ and 17° 20′, the northern edge of the bank of soundings will be found. Some miles farther the depths diminish from 30 to 20 and 16 fathoms; and when in lat. 17° 55′ the *Calladas Shoals*, coral banks of 6 to 8 fathoms may be met with; the outermost is 22 miles N.E. by N. ½ N. from the lighthouse, and the innermost is 16 miles, or within sight of the light. Then steer to the westward, and bear to the southward, so as to pass 2 or 3 miles to the westward of the lighthouse.

In coming from the *southward* the soundings will be found to decrease regularly towards the shore. At 30 to 45 miles South of the Abrolhos there is 11 fathoms at 10 miles off shore, 16 fathoms at 25 miles, and 22 fathoms at 35 miles. Steer so as to be in 22 fathoms, when in lat. 18° 35′ or 18° 40′, and then the light will soon be made out by steering to N.E. by N., keeping in that depth. As soon as you gain sight of the lighthouse the depth will decrease from 22 to 19 and 16 fathoms, and in the channel to from 9 to 11 fathoms. By keeping in the depth of 22 fathoms, till the light is well made out, you will be safe from the *Poppa Verde*, the dangerous 16-ft. spot on the S.W. side of the channel.

In passing outside the Abrolhos, the only guide to keep clear of the dangerous Parcel das Abrolhos is a just estimate of the distance from the islets. To do this by the eye alone is manifestly difficult, and would be very hazardous with many. The reef stretches for 4 miles to the East and N.E. of the islets, and to 6 miles to the S.S.E. The soundings outside are very irregular, and afford but little guide.

The group of islets is nearly of a circular form, and it will be found that in all directions between North, East, and South, you will be at least 3 miles from the reef, and 8 or 9 miles from the lighthouse, so long as the *angle subtended by the whole group is not less than* 7° or 7° 15′. It will suffice then, for security, to measure this angle with the sextant from time to time, and steer accordingly.

The channel between the coast and the reefs may be taken by a steamer with much advantage under favourable circumstances, aided by the chart and a perfect knowledge of the marks. But as this would be difficult to convey in words, it must be left to those aids.

The ABROLHOS, or BRASIL BANKS, which form either a continuous range or a series of detached flats (for they have not been completely examined), are placed on the charts as the *Hotspur*, the *Victoria*, the *Pilot Bank*, &c. These banks, which lie between lat. 16° and 22° S., and between long. 30° W., and the coast, are not perfectly known. They have been previously described on pp. 231—233. All these banks have one characteristic, that of having a hard coralline crust, and also of being very steep-to.

Baron Roussin has said that an oazy or muddy bottom is rarely found on the ground of the Abrolhos, the presence of oaze in the soundings being a certain indication that you are without the shoals. He found no part without a large mixture of sand and broken madrepore or bits of coral, and in the interior channel only; and he adds that the quality of the bottom, most common around the Abrolhos, is a whitish sandstone, composed of the debris of madrepores, and of a greater or less consistence; sometimes this stone is very firm, combined of sand and rock, mostly to the N.E. of the islets. Nearer to these, from S.S.W. to N.E. by the West, the bottom consists of ground like white mortar, in which the anchor penetrates but little, though it holds fast.

In the neighbourhood of the Abrolhos you have coral bottom; after passing them at the distance of 30 miles North or South, you will have a bottom of light brown sand and shells. The current sets strong over the shoals in a S.S.W. direction. About 30 miles westward of the islands we found a current setting at the rate of 20 miles a day; no doubt with heavy northerly winds they are much stronger, as the currents on the coast are much influenced by the winds. When the Abrolhos Islands bear S.W. by S. ½ S., they appear like two hillocks with high table land inside of them. The soundings are from 14 to 16 fathoms, broken shells and bottom rock resembling coral.—*Mr. Jeffery.*

IV.—THE COAST FROM THE ABROLHOS TO CAPE FRIO.

CARAVELHAS, or Caravellas.—Punta Balea, with its flagstaff and houses, to the N.W. of the entrance of the Rio Caravelhas, has been before noticed. It is in lat. 17° 41′ 34″ S., long. 39° 6′ 8″ W. Beyond the point the coast turns abruptly to the S.W. for 3 miles to the entrance of the Rio Caravelhas. The North bank is well marked by the line of white houses of the village of *Armaçao*, the centre of the whale fishery of all these coasts. Behind this line of houses is a remarkable tree, which serves as a land mark.

The South point of the river is a narrow strip of sand, called *Punta do Sul*, which is also marked by a flagstaff; but the patrao of the bar has his post on Punta Balea. The channels to the river are across the extensive sand-banks lying off it. There are three of them narrow, shallow, and crooked—the North, South, and East bars, all buoyed, of which the latter is the best. It is beaconed with spar buoys, which are shifted occasionally, and well kept up. The outer one, which is seldom removed, and is forked or double, bears about E. ¼ N. from Punta do Sul, and 3½ miles S.E. by S. ½ S. from the flagstaff on Punta Balea. The depth in the channel is 14 ft. at high water springs, and 7¼ ft. at low water. The other passes are also marked by beacons, but all require the greatest care under efficient pilots.

The whale fishery is still pursued here, though the fish are annually becoming scarcer. The Abrolhos is the chief field, and they are towed to the Armaçao to be tried out. The town of Caravelhas, 5 miles up the river, was formerly quite unimportant, but is now getting to be busy and populous since the establishment of the railway. Fresh water may be got at half a mile above the town. The principal exports are coffee and farina.

Colonel W. M. Roberts, in 1881, reports as follows:—"There is a very large sand-bar opposite the mouth of the Caravellas estuary, extending out 4 miles from the general coast line. It has four channels through it, but only two, the N.E. and the S.E. channels, are generally used by ocean vessels. Both of these, and also a channel called *Alagodos* (a branch from the S.E. channel), are kept well marked with stakes. At high water spring tides, the least depth in the N.E. channel is 14 ft., the general depth being 16½ ft. In the S.E. channel the least depth is 17 ft. for a very short distance. Vessels drawing 17 ft. have passed through. A vessel drawing 17 ft. was in port in May, 1881, loaded with rails for the railway now in course of construction from the interior of Minas Geraes to the Bahia seaboard.

"Inside of the bar is a magnificent harbour, perfectly protected, more than half a mile wide, and 6 miles long from the river's mouth to the upper part of the city of Caravellas, and from 23 to 33 ft. deep, in many places deeper. The terminal station of the Bahia and Minas Railway has been recently established on the left bank of the estuary, 4 miles from its mouth, and about 2 miles below the city of Caravellas. In front of the station there is a roomy, safe anchorage, in 6 fathoms at low tide. Deep water continues some distance above Caravellas.

"The railway company's contractor has an excellent steam-tug ready to tow vessels in and out through the bar under the guidance of an experienced pilot."—*Nautical Magazine*, September, 1881, p. 711.

At 14 miles south-westward of Caravelhas is the *Barra da Viçosa*, the mouth of the little *Rio Perohipe*, with the small village of Viçosa 3 or 4 miles from the entrance, which will admit vessels of 8 ft. draught. Pilots are at hand. At 18 or 20 miles up the river is one of those unsuccessful German colonies which were attempted a few years ago. It is called *Leopoldina*, and produces a little coffee, &c. *San José do Porto Alegre* is 15 miles beyond Viçosa. It is easily seen from sea, at the mouth of the *Rio Mucury*, which will only admit coasters drawing 8 ft. and under, with pilots, but is navigable within for 50 or 60 miles.

To the southward of this the coast is low, and quite uninhabited. There is nothing remarkable to distinguish any point, with the exception of the red cliffs of Barreiras de Velha, and some peculiar white spots on Punta Lençol, 2 miles southward; it is generally safe to approach within 2 or 3 miles.

San Matheo.—The village at the entrance of the little river of San Matheo is 32 miles S. by W. ¾ W. of San José do Porto Alegre, but little advantage can be gained by coming to the bar of this place. The difficulty of the entrance, wherein there is only 5 ft. of water in the ordinary high tides, and 9 ft. on the syzigies, does not allow access to any but very small vessels; and the breakers, which constantly appear at the mouth, render the navigation dangerous, even to canoes. The people of the country get over this sort of passage only with punts, drawing very little water, or on the rafts called *jangadas*, formed by uniting four or five pieces of timber, surmounted by a cotton sail.

The entrance forms a small opening, with breakers on either side, within which may be seen among the trees the masts of boats. It is said that in fine weather you may see to some distance into the interior, and at a little to the South of the bar three small downs, of which the middle one is the highest, and which serve as a mark from the eastward, then appearing as one. The bar is in lat. 18° 38′ S., long. 39° 36′ 50″. The town which bears its name is about 15 miles from the entrance.

At 105 miles to the southward from the bar of San Matheo is *Point Tubarao*, on the North side of the bay of *Espirito Santo*. The coast between, generally low and sandy, is broken by the mouths of the small rivers named *Rio Secca*, *Rio Doce*, *Reis Magos*, and *Carahipe*, which are all unimportant to navigators. No danger is to be apprehended on this coast until you reach Tubarao, from which point a reef of rocks extends to the distance of 7 cables; with this exception, and when near the bank off the bar of the Rio Doce, you may approach any part of the coast. At 2 or 3 miles off, whether advancing from the North or the South, the depths are from 20 to 9 fathoms, bottom of sand, mixed with gravel, oaze, madrepores, and broken shells.

Rio Secca.—The bar of the Rio Secca is 32 miles to the southward of that of San Matheo, and presents only a small opening between the trees on the coast. It is probable that this river exists only during rainy weather, and the supposition seems confirmed by the only information obtained concerning it.

RIO DOCE.—The entrance of the Rio Doce lies in lat. 19° 36′ 57″ S., long. 39° 45′ W., 29 miles to the S.S.W. of the Rio Secca. It is said to extend far up the country, but its entrance is too small to admit large vessels; it, however, appears like a large open space between the trees with which the coast is covered. A bank of red sand extends from each of its two points, and the entrance is again obstructed by another bank of sand, which rises above water. The northern point extends out a little more than the other, and has on it a large house.

When over the bar, you enter a noble and spacious basin, in which are some islands, and on the South side of which is a village named *Cuartel da Regencia-Augusta*, the houses of which are visible from sea. There are large warehouses for the merchandise which passes up and down the Rio Doce, which is one of the most important rivers of Brasil.

From the bar of the Rio Doce to *Ponta do Tubarao*, or Shark's Point, the distance is about 47 miles, and the general trend, with some inflections, S.W. ½ S. Great part of the coast is low, covered with trees, and the shore is of red sand; but all the interior, from the Rio San Matheo, gradually rises to the westward, and for 30 miles northward from Point Tubarao the land is more elevated down to the shores; it is only to the northward of the Rio Doce that the country, viewed from the sea, appears entirely flat, and it does not change this appearance till, in proceeding northward, you reach the offing of Mount Pascal, a distance of more than 150 miles.

There are only two small villages standing on the coast between the beach and the interior marshes, between the Rio Doce and the Serra dos Aymores, as the high lands to the southward are called. The first is a small military post a few miles to the South, called the *Cuartel Combaio;* the next is the *Riacho*, 13 miles from the Rio Doce.

The *Serra dos Aymores* are excellent land marks while sailing within sight of land. The first summits visible from sea are a line of low conical hummocks, slightly flattened, commencing in lat. 19° 30′, and increasing in elevation to the South. *Mount Mucurata*, in lat. 19° 51′, is the loftiest of the chain, and is 2,723 ft. high, seen 55 or 60 miles off. It has a triple summit, which makes it appear like Mestre Alvarez, particularly from the N.E., but no mistake can arise, as this is surrounded by other hills, and the latter stands alone. *Mount Gamello*, lat. 19° 57′, and 1,739 ft. high, stands alone on the plain between the sea and the Aymores chain.

Mount Mestre Alvarez, by abbreviation *Mestialvé*, in lat. 20° 9′, height 3,215 ft., is one of the most remarkable land marks on the whole coast of

Brasil. It stands quite alone, near the sea, and its steep sides are clothed with a dense forest, among which are large quantities of the tree producing the famous balsam of Peru. It is an extinct volcano, and shows in some directions a flat summit.

The *Barra de Santa Cruz*, in lat. 19° 55′, is easily made out by the neighbouring mountains, and by the village of *Aldeia Velha* at its mouth. The bar has only 7 or 8 ft. on it at high water. The *Barra d'Almeida*, in lat. 20° 2′, is the mouth of the *Rio Reis Magos*, quite impassable. The *Barra Carahipe*, in lat. 20° 9′, is on the same parallel with Mestre Alvarez, but is also useless; the same with the *Barra Carapebou*, in lat. 20° 13′. A *shoal*, which breaks at times with perhaps 20 to 30 ft. water, lies off here, with Mestre Alvarez bearing N. 62° W., and Mount Moreno S. 51° W., at 2½ miles S. 75° E. from the Barra de Carapebou.

ESPIRITO SANTO, or Port Victoria.—The entrance of this bay may be readily known, in advancing either from the North or the South, by conspicuous marks, seen from the offing. These are two mountains, whereof the one, situate on the South point of the bay, is named *Monte Moreno* (689 ft.); and the other, North of the bay, is Mestre Alvaro, before mentioned, which the pilots pronounce Mestialvé.

Light.—On the hill of Santa Luzia, about half a mile E. by N. from the highest peak of Mount Moreno, and on the South side of Espirito Santo Bay, is a lighthouse, which exhibits, at an elevation of 66 ft., a *fixed bright* light, visible in clear weather for 12 miles.

Mount Moreno is conical, and partly wooded, but devoid of verdure on the eastern side, and it may be seen, in clear weather, at 30 miles off. Its base forms, on the North, the South side of the entrance of the River of Espirito Santo. At 2 miles S.E. ½ S. of it are two rocks of unequal size, named the *Pacotes*, surrounded by a reef; and at about half a mile W. by S. from Mount Moreno is the *Morro of Nossa Senhora da Penha*, a rocky hill, 452 ft. high, on the summit of which is a handsome convent of the same name, in lat. 20° 19′ 23″ S., long. 40° 16′ 12″ W., visible 15 miles off.

This convent and church are very celebrated in Brasil. It was commenced by a zealous Spanish priest in 1558, and in 1575 tradition says it was finished in a single night by angels, who transported the stones on their wings. It has a great fame for removing incurable maladies, and a constant train of pilgrims come hither with abundant offerings.

At a mile N. by E. of the town of Victoria is the *Frade Leopardo*, a needle-shaped peak, 1,250 ft. high, and of singular appearance.

Two islets, situate at a short distance to the northward of Monte Moreno, occupy a great part of the harbour of Espirito Santo. Three reefs lie to the eastward of Monte Moreno: the first, *Balea Reef*, lies 1½ cable N.E. of the North extremity of Mount Moreno. *Cavallo Reef* lies 3½ cables N.E. by E. of Sta. Luzia Point light; and another dangerous reef lies half a mile E.N.E. from the last named. They are each surrounded by deep water.

Although in appearance an excellent harbour, it is not so useful as it seems, for between the South islet, called Boi (which has a house on its summit), and the foot of Mount Moreno, there is a bar, over which a vessel drawing 18¾ ft. can cross at high water springs; those of over 19 or 20 ft. cannot cross the bar at all. Within this it opens into a magnificent harbour, with 4 to 10 fathoms depth nearly up to the town of Victoria, nearly 3 miles from the entrance. There is an excellent anchorage between the two buoys lying off the N.W. side of Mount Moreno.

To a stranger, the best anchorage appears to be without the entrance, in 12 or 13 fathoms, whence the college at Victoria will be in a line with the northern base of Mount Moreno. Here you will have a bottom of oaze, good holding ground, and be a mile without all danger; and will be in a line of direction for proceeding upward, with the assistance of a pilot.

At 3 miles above the town of Victoria, and even in the town, very good water may be obtained. At the habitations on shore you may also procure wood, cattle, and an abundance of fruits of the country. The climate of this town is not very wholesome, the height of the mountains and lands around, and the great cut of the river, on the North shore of which the town is built, accounting for this condition. At about half a mile eastward of the meridian of the town is a large conical hill, on the opposite side of the river, named *Pao de Açucar (Sugar-loaf)*, 446 ft., for which you steer on entering the river, so soon as you have doubled Mount Moreno.

In entering this harbour, the first danger to be avoided is the outer reef, which has not more than 9 or 10 ft. water over it. It is just cleared to South by bringing the peak Frade Leopardo open southward of the house on Boi Islet W. by N. ¾ N. It is cleared to the North by keeping the church or convent on the summit of Nossa Senhora da Penha well open North of Mount Moreno W.S.W. Having passed this, steer for the middle of the entrance between Boi and Mount Moreno, avoiding the Cavallo and Balea Reefs on the South side, and the shoal water off the foot of the mount. A narrow channel between Balea Rock and Moreno Point having 13 ft. water, is often used by the pilots. Having passed Balea Rock, the route is along the South shore; two buoys mark the channel over the bar, the deepest water being southward of them, but too much dependence must not be placed on their being in position. A beacon marks the edge of the shoal water in the bay of Villa Veha, and one is moored off St. Joao's Battery near the town.

The town of Victoria, the capital of the province, and built like an amphitheatre, on the North side of the river, contains about 5,000 inhabitants. It is visited by two lines of coasting steamers, but is not of much importance. The population of the province amounted to 82,137 in 1875.

The rise and fall of the tide at the anchorage is about 4 ft. The tides without the entrance are not regular. Within, on the full and change, it is high water at 3^{h}.

Coast.—At about 2 miles S.E. ½ S. of Mount Moreno are Pacotes Rocks, above water; and at about 6½ miles to the S.W. of the Pacotes is *Cape Jicu*. Between, the coast is bordered by several patches of rock at the distance of more than a mile. At about 13 miles S.S.W. of Cape Jicu is a group of five or six small islets, named *Guarapari*, with 7 fathoms water close to them. The two largest islets are 2½ miles from the coast, and are visible 10 or 11 miles off. Between these islets and the coast there is a passage for small vessels. At about 4 or 5 miles farther South are two other islets, *Raza* and *Escalvada*, at 5 miles from the coast, and nearly on the parallel of the *River Guarapari*, about 8 miles from its mouth. Large vessels may pass within these islets in depths of from 17 to 11 fathoms. From the mouth of the Guarapari the coast, composed alternately of small beaches and red cliffs, runs to the S.W. for 12 miles to Benevente Point.

River Guarapari.—The entrance to this river, having 19½ ft. water at high water springs, and 18 ft. at neaps, is about 30 yards wide, and lies W.N.W. 6 miles from Isle Cavada, running into the sea between two small woody hills. The South point of entrance to the river is 50 to 60 ft. high, and has a church with a steeple, several houses, and a tall palm tree on it, being the only one in the vicinity of the river; and to the South of it are some small red cliffs. Vessels of nearly 19 ft. draught can enter this river at high water springs, as there is no surf, and lie moored head and stern in 5 or 6 fathoms water. There is a sand-bank a short distance inside the bar; avoiding this, the water is deep for about a mile up. The village is 3 cables within the entrance on the right bank. There is anchorage in the bay in 7 or 8 fathoms water, sheltered from N.E. and S.W. winds.

Benevente Bay,—From Benevente Point the low shore forming a bay trends to the N.E. and round westward for about 2½ miles to the entrance of the river and town of the same name. From the point a dangerous reef extends to the S.W. for 1¾ mile; the outer part of it forms two detached shoals about half a mile in extent W.N.W. and E.S.E., leaving a space of nearly half a mile in breadth, having 4½ to 6 fathoms water between them and the inner part of the reef.

The town of Benevente stands on the East point of entrance to the river, which is 1½ cable wide, and has 9 ft. at springs, and 6 ft. at neaps over its bar, which never breaks but with strong southerly winds. Within the river there is 1½ and 2 fathoms water. Stock of all kinds at moderate prices may be procured. A good berth will be found in 4½ fathoms water, muddy bottom with sand, with Benevente church bearing N. by E., the point E. by S., and the South Puime Islet W. by S.

It is high water, full and change, at Benevente, at 3^h; and the rise of tide is 5 feet.

To enter Benevente Bay, bring Francesa Islet, at about 5½ miles S.W. by W. of Benevente Point, to bear W. by S. ½ S., and steer for it, which will lead in South of the shoals lying off Benevente Point. When Benevente church, which is whitewashed, and stands a little above the town, bears N. by E. ½ E., steer for it, and a vessel will pass about a third of a mile westward of the shoals in 7 to 4½ fathoms water to the anchorage.

About 4½ miles W.S.W. of Benevente is the town of *Puime*, where there is a building yard for coasters, standing at the South side of the entrance to a river of the same name. This river is only available for boats, but there is good shelter for coasters behind the three islands lying off its entrance. Fresh water may be obtained here.

Itapemirim, 12½ miles S.W. of Benevente, lies 1½ mile above the entrance of a river of the same name, over the bar of which is 9 ft. at high water springs. Three islands lie off the entrance, which is difficult to navigate.

From Benevente the low shore runs to the S.W. for 11 miles to the mouth of the River Itapemirim, above described. At about midway is some high land, the North part of which, named Mount Arga, is 820 ft. above the sea, and about half a mile from the shore abreast it are some rocks partly uncovered. At 3 miles S. ½ E. from the mount and 1 mile from the coast is the *Islet of Francesa*, about 150 ft. high, having a reef extending about half a mile from its East point, with 6 fathoms water close to it. Between the islet and the shore there is from 1 to 2 fathoms water. *White Islet*, the outermost of the three islets lying off Itapemirim River, before described, and a mile from the shore, is about half a cable in length, with a rock about the same distance from its N.E. end, and a reef extending a cable from its S.W. end, having 6 and 5 fathoms water close to the breakers at its S.W. edge. At 5 miles East from the bar of Itapemirim, is a bank about a cable in diameter, with 4½ fathoms water on it.

At about 3½ miles S.W. of White Islet, on the summit of a hill, is a remarkable tree. Between lat. 21° 9′ and 21° 12′ are four or five large red cliffs, named the *Barreiras de Siry*, separated by narrow valleys, in one of which is the village of *Villa Nova*. These cliffs form one of the best marks for this part of the coast. A small islet lies about a cable's length from the middle cliff. The coast to the South is a low woody plain to within a mile of Itabapuana, at 7 miles farther on. At about 4 miles eastward of these cliffs, a 3-fathoms bank is marked on the chart, but could not be found by Captain Mouchez, who passed several times over its reported position. To the South of the Itabapuana are some small red cliffs, the southernmost on this coast. Retiro Point, at 3 miles from Itabapuana, is surrounded by reefs, on which the sea breaks, and extend a mile off.

From the parallel of Benevente to that of Santa Anna Islets, in about 22° 25′ S., the coast is backed at from 20 to 25 miles in the interior by a remarkable chain of mountains, leaving between a low extensive plain. *Mount Campos*, in about lat. 21° 34′ S., is a remarkable sugar-loaf peak; and, when on a W. ½ N. bearing, leads to the mouth of the Parahiba do Sul.

River Itabapuana.—The entrance to this river is northward of Retiro Point and the southern small red cliffs, and will be known by several large white houses on the beach. The bar has 10½ ft. on it at high water springs, and is dangerous with N.E. winds. Reefs extend off it to a distance of 2 miles.

When standing in for the town during southerly winds, a vessel should pass northward of the reef, with an isolated conical hill bearing W. by S. Anchor with the N.W. breakers S. by E. With northerly winds a vessel should anchor southward of the reefs. The anchorage is indifferent. This river is the boundary between the provinces of Rio Janeiro and Espirito Santo.

To the southward of Itabapuana for 5 miles to Point Castellanos the coast consists of the low red cliffs, previously mentioned. These are fronted by reefs which extend 1 or 1½ mile off, and are steep-to. Between Point Castellanos and the Barra Campos, a distance of 15 miles, the coast forms a bay, in the South part of which is an anchorage, named *Sacco de Gargau*, frequented by coasters during southerly winds.

The RIO PARAHIBA DO SUL, after a circuitous course, enters the sea in about lat. 21° 37′. Its length is about 500 miles, but its navigation is much obstructed by rapids above the town of Sao Fidelis, about 50 miles from the sea, which communicates with the mouth of the river by means of four steamers. In its lower course the river is wide and shallow. *Campos* is a thriving town of about 20,000 inhabitants, about 35 miles from sea by the river. It exports sugar, coffee, cocoa, &c,

Sao Joao de Barra, on the South side of the river entrance, is built on a barren sand-bank. It has about 2,000 inhabitants, mostly supported by the trade with vessels waiting to enter or leave; also by fishing, ship-building, &c.

There are two changeable channels over the bar, marked by stakes to port and branches to starboard. At high water springs there is a depth of about 8 ft. water. Pilots attend at the bar, and a flag is hoisted near the mouth of the river when the bar is practicable. Vessels waiting to enter may anchor off the bar with the flagstaff bearing between S.S.W. and S.W. With the wind on shore there is generally a heavy sea.

Sacco de Gargau Anchorage, before mentioned, is the roadstead of Sao Joao da Barra; in it vessels find good anchorage 1 mile from shore, in 5 fathoms mud. It is easily recognised by the projecting point, on which are some white houses, and also by the masts of ships entering here. A branch of the river used by boats to reach Sao Joao runs into the small bay, the main entrance to the river being on the South side of the point.

The coast South of this to St. Thomé is uniform and low, with only one mark, which is a white house on the North side of the Barra Assu.

CAPE ST. THOME'.—The low, uniform sandy shore, slightly covered with vegetation, known by the name of Cape St. Thomé, and about 45 miles from the interior mountains, curves gradually to the South round to the westward, having no salient point, and visible only at a distance of 4 or 5 miles. On the southern sweep of the shore, in lat. 22° 3′ 10″ S., and long. 41° 3′ 30″ W., is a house visible 5 or 6 miles. About 6¾ miles to the N.E. of the house are three trees higher than the others, and nearly 1½ mile to the northward of them is a sand-hill.

The LIGHTHOUSE on Cape St. Thomé is in the shape of a truncated cone, painted red, and supported on iron columns. The light, exhibiting *bright flashes* every minute with total eclipses, is elevated 157 ft., and visible 19 miles.

The Bank of Cape St. Thome' extends off the land in an easterly direction on the parallel of 22° 2½′ S. for nearly 10 miles, with a breadth of 1 or 2 miles. In this space the sea breaks heavily in different places with S.E. winds. It is steep-to; on the North side there is 7 and 8 fathoms water close to the breakers, and on the South 7 to 13 fathoms within half a mile. The outer breaker is about 9 miles from the shore, and between 1½ and 3 miles East of it there is 14 and 15 fathoms water. The inner breaker is 2 miles from the shore, and about three-quarters of a mile inside it is a channel, which may be used by vessels drawing 12 ft. with safety during moderate weather, keeping within 1 or 1½ mile from the breakers on the beach. There is a better channel through the centre of the bank, which, if buoyed, could be used by large steamers. The current in this vicinity is often very rapid, and depends on the force and direction of the wind.

Pilot or Jervis Bank.—At about 70 miles eastward of Cape San Thomé lies the bank of soundings found by H.M.S. *Pilot*, Capt. Jervis, which we have named as above. The particulars are given previously on pp. 238—239.

From Cape St. Thomé the low sandy shore runs about W.S.W., and at the distance of 6 miles from the isolated house on the southern sweep of the shore is the *Barra Iguassu*, leading into the river of that name, and 2 miles beyond it a remarkable cocoa-nut tree. At 3 miles westward of this cocoa-nut tree is another tree, with four or five houses, between two outlets from Lake Feia. The largest of these outlets is called the *Barra do Furado;* at 33 miles farther on is the mouth of the Rio Macahé, having S.E. of it a small islet named Papagayos, and E.S.E., distant about a mile from the latter, is a rock, barely awash, and which does not break, with 5 to 8 fathoms water close to it.

This low shore is all along clear of danger, with the exception of Hermes Rock, distant 3¼ miles N.E. ¾ E., from Papagayos Islet.

Hermes Rock is about 12 yards in extent, N.N.W. and S.S.E., and 4 yards wide. It rises almost perpendicularly from the bottom, forming three heads, *which do not break*, on the S.E. of which is 4 ft., and on the two others 10 to 14 ft. at low water. From the rock, which is distant 1½ mile from the beach, the church of Santa Anna bears W. by S. ¼ S.; extreme North end of Santa Anna Islets S. by E. ¾ E., distant 4 miles; centre of Papagayos Islet S.W. by W., 3¼ miles; Santo Domingo Hill N. ¾ E.; and the summit of Imburo Hill N.W. ¾ N.

The church of Santa Anna stands southward of the centre prong of *Iriry Mountain.* This mountain is small, detached, and has four peaks, the centre being the largest and highest, and rises inland a short distance South of the port of Macahé. *Imburo Hill* rises a little North of the town of Macahé, is the highest hill in its vicinity, and its summit is covered with wood, and inclines to the South. *Deitado Hill* is in the same direction as the preceding one, a little more inland, and having a large spot on it is easily recognised.

When bound to the northward from the anchorage off Macahé, to avoid Hermes Rock, do not steer to the N.E. until the vessel is eastward of the Santa Anna Islets. If it is necessary to tack, in making the northern board, the church of Santa Anna should not be brought on with Iriry Mountain until the vessel is eastward of the meridian of the islets.

River Macahe.—The mouth of this river lies about N.W. ¼ W., distant 4¼ miles from the largest of Santa Anna Islets. It is about 70 yards wide, and admits vessels of 9 ft. draught at high water. On its southern side a fort stands on the northernmost of two hillocks. The town of the same name, consisting of about 150 houses, stands on rising ground near the mouth of the river, where also, near the summit, is the church and flagstaff. If the flag be hoisted it is a signal that the entrance is safe. In the river, water may be obtained in any quantity. At times the water from this river causes the sea in the vicinity of Santa Anna Islets to be much discoloured, like that of a sand-bank.

SANTA ANNA ISLETS.—At the distance of about 21 miles N.E. by N. from Cape Busios, and 4½ miles from the entrance to the Macahé, are three small islets, named Santa Anna, lying in a N.E. and S.W. direction over a space of 2¼ miles. The centre islet, 492 ft. high, is the largest. Two rocks above water lie off the N.E. end of the easternmost islet, from which a shoal extends to the northward nearly a mile, with 10 ft. water on it. The channel inside them is impeded by a bank, extending from the North end of the largest islet to the main, with 3¾ to 5 fathoms water over it. With the exception of this bank the soundings round the islets are regular.

Anchorage will be found West of these islands in 5 to 7 fathoms water, well sheltered from easterly winds, with the S.W. part of the large islet bearing

South; the northern part E. ½ S.; and Papagnyos Islet, at the entrance of the River Macahé, N.W. by W. ½ W., about three-quarters of a mile from the sandy beach. Large vessels should anchor farther to the southward, with the S.W. point of the large islet to the eastward of S.E., distant 1 mile, in about 7 fathoms, as the water shoals suddenly on the S.W. side of the bank, and likewise towards a sandy beach on the large island. The best route to this anchorage is round the southern islet, which is clear of danger.

About the middle of the sandy beach of the large islet there is a passage through the trees to a well of scanty and indifferent water; fire-wood may be obtained here in any quantity close to the beach.

From the mouth of the Macahé the coast trends to the south-westward for nearly 13 miles to that of the *Rio das Ostras*, an unimportant stream, off the mouth of which coasters find anchorage in 2 or 2½ fathoms water, sheltered from the eastward by three small islands. Between Macahé and Ostras is *Point Pecados Mortaes*, a spur of the Serra de Iriry; to the northward of this point the shore is called the *Praia das Pedrinas*, and southward of it *Praia Iriry;* this latter part is foul, and sunken rocks lie off it at 1¼ mile from the beach. There is also a sunken rock 2 miles North of Point Pecados Mortaes, at three-quarters of a mile from the shore.

CAPE BUSIOS.—From the mouth of the Rio das Ostras the shingle shore curves to the southward and eastward for about 18 miles to *Cape Busios*, a high, bold point projecting northward, and forming Santa Anna Bay. The rivers San Joao and Una fall into the sea between the Ostras and the cape, the former of which has a good anchorage for coasters within its bar, which may be crossed by vessels drawing 11½ ft. at springs. The town of *Barra*, which exports dye woods, &c., lies within the entrance on the left bank of the river. The *Serra San Joao*, 2,658 ft. high, North of the river of the same name, and about 3½ miles inland, is an isolated conspicuous mark, and 20 miles northward of it is the *Frade de Macahé*, 5,741 ft. high, a remarkable peak leaning to the northward, with the serras of the same name running to the S.W., and those of the Imbé to the north-eastward.

Armaçao Bay, on the North side of Cape Busios, affords sheltered anchorage to vessels from south-easterly winds, in from 5 to 8 fathoms water, muddy bottom. A small islet, named *Branca* or *White Islet*, lies at the eastern entrance to the anchorage; and at 2½ miles W. by N. ¾ N. of it is *Feia Islet*, wooded, with rocks extending from its N.E. side, and at the distance of 1 mile from it, in the same direction, is a rock which partly uncovers at low tides, with 12 and 13 fathoms water close to it. The highest peak of Ancora Islet, East of the cape, in line with the S.E. side of Branca Islet, leads on the rock. Ancora Islet open northward or southward of Branca Islet, leads clear of it.

In the western part of the bay is *Raza Islet*, with breakers to the southward of it, and some rocks eastward of it; at half a mile northward of it is a large rock uncovered. The bay has a white sandy beach, which extends to the Morro St. Joao. The passage between Branca Islet and the main should not be used in a sailing vessel unless with a fair wind; with steam it may be taken at any time. The village of Armaçao consists of about thirty houses. Water, in small quantities, fruit, and poultry, may be obtained.

ANCORAS ISLETS.—At about 5 miles E. by S. from Cape Busios is the eastern and largest of two islets, seen at a distance of 20 to 25 miles, called Ancoras or Anchor Islets. To the southward of the inner one is a large white rock, which is connected to it by a reef. The eastern islet, 361 ft. high, is said to resemble a cardinal's hat. Between the islets there is 23 or 24 fathoms water, and in mid-channel between Cape Busios and the inner Ancoras there is from 18 to 21 fathoms.

Papagayos.—The continental coast between Cape Busios and the *Isle Frio* forms a bay called *Papagayos* (or *Parrot's*) *Bay*. The bearing and distance between its extreme points are S.W. by S. ½ S., 14 miles. A great portion of the bay is occupied by a group of islets and rocks.

Papagayos Rock, discovered by Captain Mouchez in the *d'Entrecasteaux*, lies 1 mile E.S.E. from the highest of the group (365 ft.). It is very small and *very dangerous*, having only a very small point even with the water, and 7 and 8 fathoms close to it.

At about 6 miles to the northward of the Isle Frio, and at the North end of a low sandy beach, are a small fort and flagstaff, on the South side of the entrance of a little river, which falls down the village of Papagayos.

Lake Araruama extends nearly parallel to the coast for 21 miles westward of Cape Frio, with a breadth varying from half a mile to 7 miles. There is a depth of 9 ft. at the entrance, which lies 8 miles North of Cape Frio; the navigation of the lagoon is intricate.

V.—CAPE FRIO TO RIO JANEIRO, INCLUSIVE.

CAPE FRIO and LIGHTHOUSE.—Cape Frio is a high and rugged promontory, the south-western extremity of an isle bearing the same name, which forms, on its N.W. side, a convenient harbour, *Port Frio*, affording good shelter, although it is open to the N.E. The summit of the isle is in lat. 22° 59′ 55″ S., long. 41° 59′ W.*

The *lighthouse* had long been established on the summit of the island, at an elevation of 1,285 ft., far too high, being frequently obscured by mist and haze, so that no dependence could be placed on seeing it. It was therefore superseded in 1862 by a handsome iron lighthouse erected on Focinho do Cabo Point, the southern extreme of the Island of Cape Frio, at nearly 1½ mile to the south-westward of the old lighthouse. The tower is round, painted a light stone-colour, and 53 ft. high.

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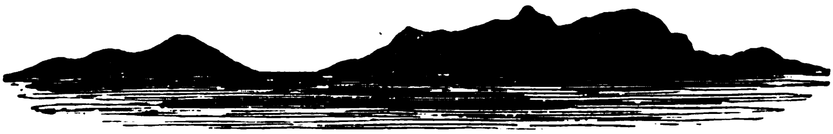
* Electric Telegraph.—Vessels bound to Rio de Janeiro, on approaching Cape Frio, are required to indicate, by means of the International Code of Signals, the following particulars, namely,—Ship's name, port of departure, days of passage, cargo on board, consignee's name, shipping and commercial news. This information will be transmitted to the Exchange at Rio de Janeiro by the electric telegraph established at Cape Frio. When passing at night, or in foggy weather, such news to be furnished to Punta Negro or Santa Cruz stations. Vessels not possessing the signals may still anticipate the news of their arrival at Rio de Janeiro by writing the same information in large white letters on a black board, and hanging it on the ship's side passing Fort Santa Cruz at the entrance of the harbour, when the telegraph therein established will convey the news to town.

It shows a *revolving bright* light, attaining its greatest brilliancy every *minute and a half*, and is seen in all directions from seaward through an arc of 225°, or when bearing between S.W. and East. The elevation of the light is 522 ft. above the sea, and it should be seen 25 miles. The duration of the total eclipse is 45 seconds. The former light on the summit of Cape Frio is discontinued.

Frio Isle, which forms the S.E. side of the harbour, is 2½ miles in length, N.E. and S.W., and 1 mile in breadth. Great part of it is covered with an almost impenetrable wood. Beautiful flowers abound in every part; but there are also reptiles in most extensive variety, together with insects, many of which are distressingly troublesome.



Cape Frio, bearing W. by S. 25 miles.

The Isle of Frio may be seen under favourable circumstances at 45 miles off. When bearing from the East or the West it presents two mountains, one of which is 1,570 and the other 1,300 ft. high, above the level of the sea; the southern is the smallest, both in height and breadth. On a N.N.E. and S.S.W. bearing these two mountains seem to form one mass, with a double summit, like two small points. A rocky patch of 2½ fathoms, lies nearly a cable southward of the cape.

PORT FRIO, or the harbour, is more than a mile in extent each way, and its depths are from 19 to 4 fathoms; but in the centre, 12 to 16 fathoms. Its principal entrance is at the East end, on the South side of an elevated islet, named *Ilha dos Porcos;* this entrance is about two-thirds of a mile wide, and its depths are 25 to 15 fathoms, bottom of fine mud and sand.

The *South West entrance* is very narrow, but has a depth of 10 and 12 fathoms, and there is anchorage almost immediately within it, for large ships, in 7 to 10 fathoms. From the main land on the West side of this entrance a sand-bank, with 1 to 2 fathoms water over it, extends for 1¼ mile to the N.E., where it joins Cape Frio Island, leaving a narrow channel of 13 ft. between its N.E. point and the island; this is called *the bar*. Coasting steamers frequent this passage during N.E. winds, to avoid the rough sea outside.

The harbour is commodious, and secure against all winds, excepting N.E., but even with the latter you may be sheltered by the little isle *dos Porcos* (360 ft. high), which lies on the North side of the entrance. This anchorage, wherein the bottom is of good holding ground, is useful to the coasters, who can go out by either of the passes, according to their destination northward or southward, and the direction of the winds. Heavy squalls are sometimes met with in rounding the cape.

A small fort stands on a rocky point between two sandy coves on the N.W. side of the harbour, and entirely commands the principal entrance to the anchorage. A little within this fort is a village, occupied mostly by fishermen, where fresh provisions may be obtained. There are some fine sandy places here for hauling the seine, which appears to be the chief occupation of the inhabitants. Water may be had from wells in the coves on the North and N.W., as well as on the island near its West end, where huts may be seen.

Tides and Currents.—S.W. and N.E. winds produce N.E. and S.W. currents, from a half to 1½ mile per hour. With S.W. winds there is a S.W. eddy in-shore; the currents usually precede the winds. It is high water, full and change, at Port Frio, at 11^h 40^m, springs rise 4½ ft.; S.W. winds raise the water 2 or 3 feet.

Bank off Cape Frio.—The commander of the Italian frigate *Garibaldi* (1873), when in about lat. 23° 4′ S., long. 41° 46′ W., obtained a sounding of 16 fathoms, Cape Frio lighthouse bearing W.N.W.; then on a S.S.W. course obtained 15, 14½, 12, 9, 14½, 16, and 76 fathoms successively, the latter sounding being obtained S.E. ½ S. about 13 miles from Cape Frio, in lat. 23° 11′, long. 41° 50½′.

CAPE NEGRO.—From Cape Frio to the entrance of Rio de Janeiro the course is nearly West, and the distance 63 miles. The coast between is everywhere steep-to, and consists of a high, yellow sandy beach, backed by high land, a few miles to the northward, showing in peaks and hills. At about 26 miles eastward of Rio de Janeiro, the sandy beach is interrupted by Cape Negro, a dark level piece of land, about half a mile in extent, and some 80 ft. high, which terminates abruptly, and may be recognised by the land at its back, being very high and dark, with more irregular hills to the eastward. At 10½ miles eastward of Cape Negro, on a sandy hill, is a cathedral dedicated to Nossa Senhora de Nazareth; it has been lately restored, and being white is conspicuous from sea.

The shore is here called Masambaba, and within it is the Araruama lagoon. North of Maricas Islets, and near the beach, at 3 or 4 miles eastward of the False Sugar-loaf, is a remarkable round hill, about 850 ft. high, with the western side of its base level with the low land, and much resembling Redonda Island. This hill will point out the position of the Maricas Islets.

Maricas Islets.—At 13 miles westward of Cape Negro, and about 3 miles from the beach, are two islets, named the Maricas, of moderate height (about 120 ft.), which may be approached with safety. The water near the islets is deep and there are no dangers but what are in sight; they are steep-to on the South side, and at 1½ mile westward there is 17 fathoms water, and 10 fathoms close to the beach. Temporary anchorage, with fine sandy bottom, will be found westward of the islets with northerly winds. There is landing near the N.W. end of the larger islet.

Itaipu Point, 19 miles westward of Point Negra, is marked on the East side by a mountain 1,312 ft. high, known as the *False Sugar-loaf.*

RIO JANEIRO.

All the land around the Bay of Rio Janeiro, whether islands or coasts, is perfectly safe, and steep-to. There is neither bank nor danger to embarrass navigation, and there are only one or two reefs near the islands, but these, being always above water, are readily avoided. The outermost is that which is 1 mile S.W. of Redonda.

The approach to the harbour is so simple and easy that all pilotage is unnecessary. There is nothing to fear. The shores are perpendicular from the bottom, and the lofty granite cliffs and mountains are easily recognisable.

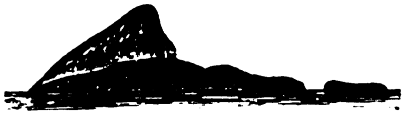
The mouth of the harbour of Rio Janeiro lies between two islets, named *Pay* and *Mai*, on the East side, and a bold point, surmounted by the *Gavia*, a remarkable mountain, on the West. In front of it are the islets *Redonda* and *Raza*, within and northward of which are several other islets. From Pay to Gavia the bearing and distance are W. ½ S., 11 miles.

RAZA LIGHTHOUSE.—The Islet Raza is about 4 cables long, and 270 ft. high, and appears from the East like a slipper, with the sloping side northward. An islet lies close off its North point, and there is a landing-place and flagstaff near its N.W. end. It is distinguished by a square white lighthouse, 50 ft. high, showing a *revolving* light, elevated 315 ft., and visible 10 to 14 miles off. It makes a revolution in every 2½ minutes, and presents alternately *two bright* faces, and *one red*, every *third* flash thus being *red*. The utility of this light is too obvious to require comment.

Harbour Lights.—Besides this powerful light on Raza, there is a *fixed bright* light on Fort de Santa Cruz, on the East point of the entrance to the harbour, visible 6 miles off; and on the fort on *Calhabouco Point*, the eastern extremity of the city, a *fixed red* lantern light is exhibited occasionally when steamers are plying.

At 2½ miles W. ½ S. from Raza is another isle, more elevated, appearing exactly like a haycock, and called *Redonda* (Round) *Island*, 726 ft. high. A small islet lies near its S.W. side, and at 1 mile S.W. of it is a reef, which shows 10 ft. above low water.

These isles are very useful marks to vessels bound to the harbour; for a vessel bound to Rio Janeiro should, after rounding Cape Frio, steer due West, keeping about 9 miles from the coast, until she makes Redonda, and which will be descried before Raza can be seen, although the latter lies 2 miles more to the eastward. CURRENTS, at times, set along the coast, either East or West, according to the winds, and thus retard or facilitate the ship's progress.


Raza and Redonda, bearing W. ½ S. about 9 miles.

The position of Rio Janeiro may be seen by night frequently, at very great distances. When the masses of cloud, *cumulus* or *cumulo-cirrus*, overhang the city, the reflection from the innumerable gas lights causes such a strong glare in the sky, which is quite unmistakable, that its situation is certainly known by it very long before the light comes in sight. This is the case with most or all maritime towns of any magnitude, but is especially noticeable here.

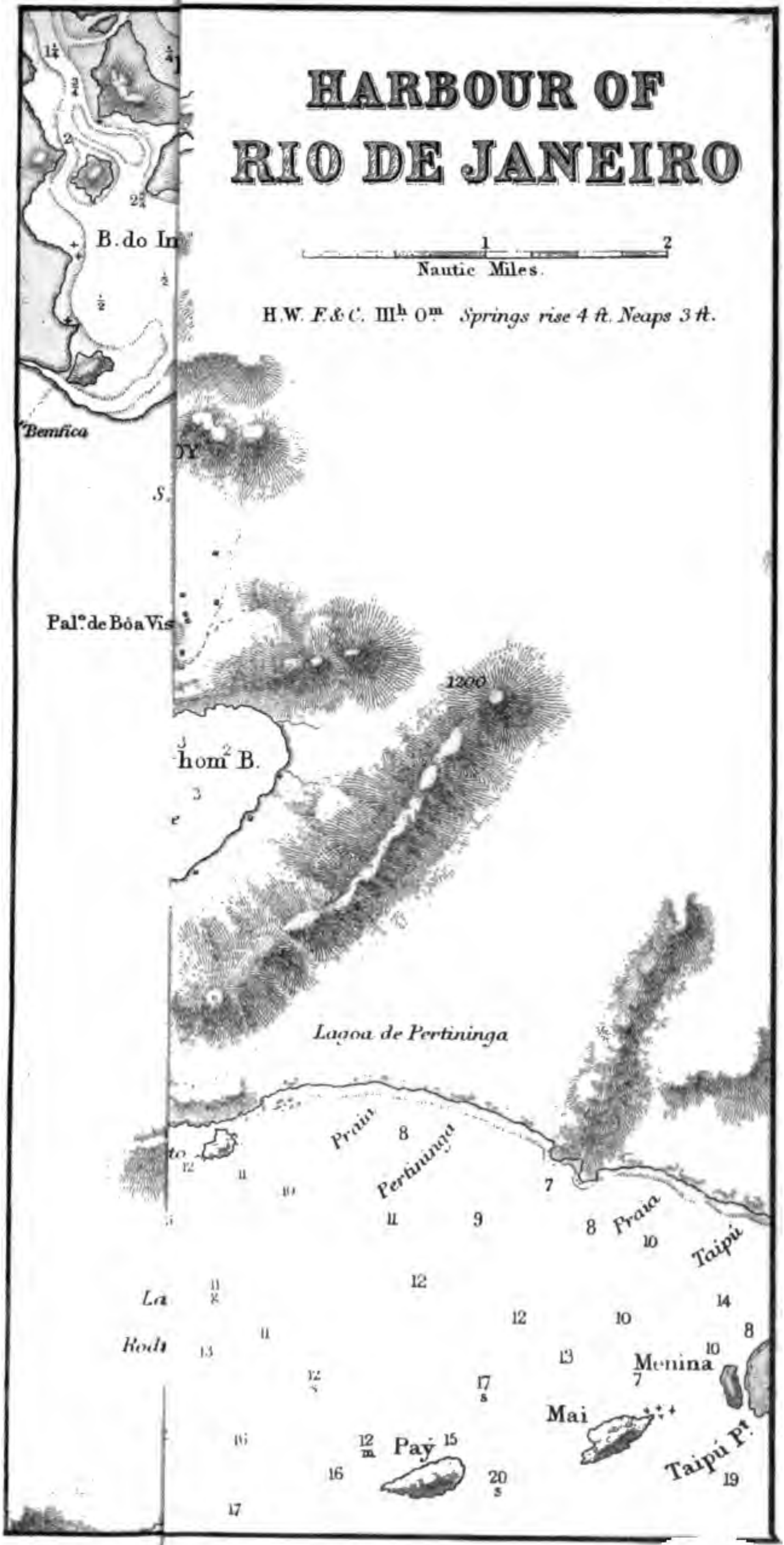
The first land generally seen, on advancing toward Rio Janeiro from the eastward, is Cape Frio, giving its name to the adjoining district. Without the cape on the North is the Bay of Papagayos, which exhibits a fair specimen of Brasilian scenery.

From *Cape Frio, westward*, a stranger, having no vessel under his care, would proceed most pleasantly along the shore, until the *Ilha Pay* is brought on with the Sugar-loaf, on the western side of the Rio Janeiro. This would give him an opportunity of seeing every inlet on the coast, some of which, bordered by lofty masses of naked granite, are very beautiful. It would place before him, almost in a line, the *Corcovado, Gavia, Two Brothers*, and other mountains of singular form, uncouth names, and stupendous altitude. During the morning fogs, which hover about the shore, some of these raise their heads high above the mists, and serve as guides to the port; the Gavia is the most to the West, of the greatest height (2,575 ft.), and has a remarkable flat top, which seems an immense cube, or table of stone, with perpendicular sides, placed upon a mountain. The Corcovado, a little more to the eastward, is a lofty point of rock (2,272 ft.), which appears to pierce the heavens. Steering for this, when far out at sea, brings a vessel near to the *Sugar-loaf*, a much lower and conical mountain (1,270 ft.), with its steepest side to the West. Close to the foot of this rock lies the passage into the harbour.

While rounding Pay Isle the entrance is not visible, but in proportion as the Sugar-loaf draws to the northward of the ship, the gorge opens, and through it is beheld the calm expanse of what is generally deemed the finest bay in the world. The entrance is about a mile wide, and fenced on either side by solid masses of granite, one entire stone without a chink; that on the West is nearly 600 ft. high, commonly estimated at much more; its neighbour on the other side rears its head to a somewhat greater elevation, and is topped with a signal-staff, from which notice is given to the city of approaching vessels. Both hills are very abrupt and skirted with forts, the advance of which is defended on both sides by strong double curtains. Immediately in front, and a little within the narrowest part of the entrance, is the square and low *Fort Lagé*, situated upon a mass of naked rocks, against which the water breaks with violence, and in stormy weather sometimes overtops the battlements, reducing the garrison to great distress and some danger. The *Fort of Santa Cruz*, on the right hand, is very formidable, and the water is deep close to the rock. These forts have been much improved of late years.

The mountain called La Gavia is situated about 9 miles W. by S. from the entrance of Rio. It is seen from all points of the offing between East and S.S.W. Its top appears to be flat, and rather larger at its summit than a little way below, which gives it the appearance of a ship's top, from which it is named; hence it cannot be mistaken for any other mountain, and it is the best object for distinguishing the coast. It is situated in lat. 22° 59′ S., and long. 43° 13′ W.

At 11 miles E. ¼ N. from the Gavia is the *Pao de Açucar* or Sugar-loaf, the conical mountain of rock on the western side of the entrance to Rio Janeiro.


HARBOUR OF
RIO DE JANEIRO
1
2
Nautic Miles.
H.W. F.&C. III^h 0^m Springs rise 4 ft. Neaps 3 ft.
B. do In
Bemfica
Pal^o. de Bôa Vis
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hom B.
Lagoa de Pertininga
Praia Pertininga
Praia Taipú
La
Rodi
Menina
Mai
Pay
Taipú P^t.

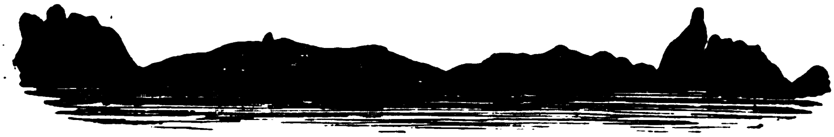
This rock has been generally considered as the beacon which serves to mark that entrance; but being much lower than the Gavia, it is not seen at so great a distance.

These remarkable land-marks cannot be mistaken in approaching from the S.E. or S.W. The summits present a singular resemblance to a sleeping giant; the Gavia forms perfectly the head, with a Bourbon profile, and the feet are formed by the Sugar-loaf. When the King of Portugal arrived here, in 1807, a painting was exhibited of this recumbent colossus as the genius of Brasil, with the words "Giant, arise!" written over it.

It is prudent, in general, to keep at some distance from the coast which connects Rio Janeiro with Cape Frio; because, when the wind blows from S.W. to E.S.E. by the South, the swell is incessant, and in rough weather it renders the anchorage very unsafe. You should not approach the islands at the entrance of Rio until the sea-breeze is well set in; and then you must manage to reach an anchorage before night. Without this precaution, you will be exposed to the swell and currents by stopping among the islands, or at the entrance, during the calm which intervenes between the sea and land breezes; or encounter the latter, which directly opposes the entry, and is very often accompanied by gusts of wind, which are sometimes violent, more especially at the full and change of the moon.

If, notwithstanding all precautions, the land-breeze should set in before you have entered the harbour, and your vessel sails badly, or if the current, which almost always sets outward, will not allow you to reach the inside of the bay by tacking, it will then be more advantageous to remain outside of the islands than to anchor among them. The space for tacking is very limited, especially during the night; the ground is hard, and the swell of the sea is the stronger and more troublesome the nearer you are to the entrance. The strongest gusts of wind from the land-breezes seldom extend farther out than to Redonda, or Round Island.

On entering and leaving the Harbour.—The passage generally preferred, on entering and leaving the harbour, is that between the isles Pay and Raza. The first lies 4½ miles S.E. by E. from the Sugar-loaf, and the latter 7 miles South from the same. The isles are steep-to, and you may pass close to on either side. In the channel between there is from 21 to 11 fathoms, bottom of gray sand.



The entrance to Rio Janeiro, bearing W.N.W.

Should you enter at a mile to the West of Raza, or midway between Raza and Redonda, you will then have the western point of Pay bearing nearly N.E., and a direct course thence N. by E. ½ E., 8 miles, will carry you to the West of the fortress of Santa Cruz, which stands on the eastern side of the entrance. On this track you leave, at a distance to the West, several islets and rocks, lying to the northward of Redonda, and pass about 2 cables to the

East of the islet *Catanduba*, or Toucinhos, lying nearly a mile to the S.S.E. of the Sugar-loaf. On this route the soundings decrease gradually from 24 to 7 fathoms, bottom of fine gray and white sand, stiff ground. There is no danger, and nothing to avoid but what may be seen.

The least depth of water at the entrance of Rio is 5½ fathoms; having passed this, the depths increase rapidly; in one cast of the lead you may have from 11 to 14 fathoms, very near to the battery of Santa Cruz. You may safely approach still nearer to the opposite side, but the first direction is the most followed, it having the treble advantage of leading a vessel near to the fortress which must be passed within hail, of answering the signals made therein, and of keeping clear of the little isle *Lagé*, with its fort, on the opposite side of the channel. Thus, also, you will avoid the effect of the current, which sometimes runs N.W., when the tide is rising.

The passage between the Fort of Santa Cruz and that of Lagé is the only one frequented; that between the latter and Point St. Juan is never used, not from want of depth, but because it is narrower, and exposed to shifting winds from about the Sugar-loaf and other high lands. Here, also, the current is irregular and the ground rocky.*

Anchorage.—From about 3 cables' lengths off Fort Santa Cruz the direct course to the anchorage for ships of war is N.N.W. until you are E.N.E. of the fort of *Villegagnon*, which you pass safely at the distance of 3 cables. Vessels of war anchor anywhere eastward of the city, but southward of a line drawn from Rat Islet to the largest church having two towers, and with the Pao de Açucar or Sugar-loaf open eastward of Fort Villegagnon. in 15 to 21 fathoms water, muddy bottom; or more westward if convenient, with the Sugar-loaf over the western house in Fort Villegagnon, in 7 or 8 fathoms. Vessels generally moor open hawse to the S.W. Merchant vessels anchor northward of Ilha das Cobras, in 5½ or 6 fathoms; and coasters off the city southward of Cobras. Ships should not anchor in the fairway of the ferry steamers plying between the city and Nitheroy. The authorities require all vessels to have buoys on the anchors.

There is also anchorage between Fort Santa Cruz and Three-fathoms Bay, on the eastern side of the harbour, in 5 or 6 fathoms water.

A bar of sand with some rocks extend to the S.E. from Cobras for a distance of half a mile, fronting the town, and leaving a small passage between the South end and Calhabouco Point. The least water on this bar is 1 fathom; at low water, with a heavy swell, the sea breaks on it, and renders it dangerous for boats passing across; between the bar and the city there is from 2 to 7 fathoms; here all merchant vessels, when there is room, discharge and take in their cargoes. The passage for large vessels is round the North side of the island. Off the East end of Cobras is Rat Islet with some rocks between. A patch of 21 ft. lies N. by E. nearly 2 cables from Rat Islet.

Winds, Climate, &c.—In the harbour the sea-breeze generally sets in between 10 and 1 o'clock in the forenoon, and ceases in the evening between the hours of 7 and 11. The land wind blows all night, ends at 9 or 10 o'clock in the morning, and is succeeded by an interval of calm. As a rule the warmer the weather, the land and sea-breezes are more certain and strong. The sea-breeze is rarely felt more than 8 or 10 miles South of Raza, and the land-breeze rarely blows outside the bay. At the full and change of the moon heavy squalls from the N.W., named "Terre Altos," sometimes succeed the sea-breeze, lasting from four to six hours. The S.W. is the bad-weather quarter in Rio Harbour, the wind blowing in fierce and dangerous squalls, with much rain; when the outline of the Organ Mountains, which bound the northern side of the harbour, is clear and sharp, rain may be expected. April, May, and June are the rainy months.

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* When vessels enter the harbour at night, a signal is made from Fort Santa Cruz to the city, which is not to be understood as interfering with the vessel's entering. Merchant vessels passing Villegagnon Fort are liable to be fired at and fined.

The hottest months are January and February, the coolest July, with an average temperature of 78° Fahrenheit. The quantity of vapour contained in the atmosphere at Rio is the chief cause of sickness to foreigners. Although the climate is not a healthy one, much sickness may be prevented by taking proper precautions, one of the most important of which is to avoid working the crews during the heat of the day and in the sun; it is recommended to cease work between 10 a.m. and 2 p.m. The greatest precautions should be taken to prevent the smuggling of intoxicating liquors on board, as the adepts at this practice in Rio seem to have reached the utmost perfection.

The hospitals are a credit to the city, and afford ample accommodation for any emergency. Foreign seamen are admitted by the application of their consul. The most sickly months are February and March.

Fogs are frequent during the morning, when the phenomenon of *mirage* may sometimes be seen; this, however, always disappears with the setting in of the sea-breeze.

The Tides are not regular or of equal duration, as the ebb generally runs much stronger than the flood, more especially after heavy rains. The ordinary velocity of each rarely exceeds seven-tenths of a mile in the hour; but at times it may run at the rate of 1¼ mile, principally during the ebb. The time of high water, on the days of full and change, is 3^h, and the vertical rise 4½ ft.; neaps only 3 ft. The safety of the anchorage is nearly uniform, and is very rarely disturbed by winds causing serious accidents.

The Bay of Rio Janeiro is very spacious, and one of the most magnificent in the world. Its extent in diameter is from 9 to 12 miles, in several directions, between mountains of majestic elevation, covered with the richest verdure, and terminating in an easy declivity, occupied by numerous villages down to the sea. Plantations of all sorts, handsome country houses, surrounded with trees, many isles, woody and inhabited, ornament and diversify the surface and the coasts of this little inland sea, and there is not on the globe a more beautiful residence, or an aspect more imposing or agreeable.

The bay is defended by the forts before mentioned, which are constantly being improved and increased; none of them, however, are iron-plated, and there are not many heavy guns mounted.

The anchorage for large vessels does not extend far to the North of the parallel of the city, but all the bay is navigable for a multitude of small vessels or country boats, which form an animated scene.

A stay made in the road, as in most roads subject to a high temperature, causes on the ship's bottom the adhesion of a great quantity of barnacles and other marine productions, which vegetate quickly, and soon cover over all of the sheathing; these injure the copper, and impede the velocity of the vessel, and must therefore be frequently cleaned off.

Fish are not abundant, owing to the number and motion of the vessels; and the consumption of those taken is not safe, in consequence of the great number of vessels sheathed with copper. Shell-fish, and oysters in particular, ought to be avoided.

On leaving the Road of Rio Janeiro, the most simple precautions only are required; in a sailing vessel it will be sufficient merely to attend to the land-breeze and the ebb tide, allowing them to carry you along; even the ebbing is not essential if the breeze has that strength which it usually acquires during certain hours daily.

To be better prepared for getting under weigh, vessels frequently, on the evening before their departure, get on the side of the bay which faces the town, by which they avoid any obstruction to the road, properly so called; and some take advantage of the strength of the land-breeze, but this is not really necessary, for a vessel may easily set out from any part of the usual anchorage.

The route for going out is the same as for entering; passing at 3 cables' lengths to the East of the Isle Villegagnon, and at the same distance on the same side of Fort Lagé, and ranging within hail of the Fortress of Santa Cruz, taking care in this track to keep over to the eastern side rather than the other: these are the only requisite precautions.

As you generally weigh anchor in the morning, it is probable that you will have the advantage of the land-breeze at least for four hours; this will enable you to pass all the isles in the bay; and, having arrived here, you may tack according to circumstances. Should you experience a calm between the land and sea breezes, before you get without the islands, it will be proper to anchor, choosing a favourable position, so as to get under weigh again with the first breeze that ensues.

The CITY of RIO de JANEIRO, or SAO SEBASTIAO, contains all the buildings and attributes of a large and handsome city. It is built on a low and marshy plain, surrounded by the sea on two sides, and on the third hemmed in by two small parallel ridges running E.N.E. and W.N.W., which shut out the sea-breeze. Therefore its position, and the difficulty of drainage, formerly caused much unhealthiness and many disagreeables at variance with its pretensions as a capital, but this serious drawback has been obviated by an English company which has undertaken the drainage, and Rio de Janeiro will compare favourably with many cities of equal size in Europe.

Since 1835 it has formed the metropolitan district *(corte municipio)* of Brasil, and is now the capital of the province, which was formerly *Nitheroy*, on the opposite side of the bay to the eastward. In 1819 it contained a population of 120,000, and in 1840 only 140,000. It now contains about 275,000, the population of the province in 1875 amounting to 782,724. It is a busy place near the quays and in the principal streets, which are straight and well paved. It is considered one of the best lighted cities in the world, being brilliantly lighted with gas up to the foot of the surrounding hills, which causes that reflection in the sky before mentioned, sometimes visible 90 to 120 miles off at sea. Among some later improvements may be noticed the extension of the custom-house, and the formation of excellent docks. Street tramways extend to all parts of the suburbs, and ferries connect it with Nitheroy, on the opposite side of the bay. There are many landing places at the quays before the town. Some are simply slopes or hardways, others have stairs.

Another feature of the city is the fine Carioca Aqueduct, which brings water from the Corcovado, constructed in 1750 of stones brought ready prepared from Europe. The environs of the city are extremely picturesque, and afford the most charming walks imaginable. The noble bay, like the Reconcavo of Bahia, has not had justice done to it in any work on Brasil. One of the most interesting localities is *Petropolis* (named after the Emperor); it is reached by steamer, leaving Rio at 1 p.m. daily, which lands you at the railway station, at the head of the bay, from whence you are conveyed to the foot of the lofty mountains, and then up to the summit by vehicles to the new city, at 3,000 feet above the sea, a colony of Swiss and Germans, founded by the present Emperor in 1846, who has a handsome residence there. At 2 miles distant from it is a flourishing cotton-spinning and weaving factory.

The botanical gardens are well worth a visit; they may be reached by means of omnibuses. The English church is a neat, orderly little building, and is usually well attended. The communication by steamer between Rio de Janeiro, and other ports of Brasil, also to Europe, the United States, &c., is very frequent, and there is also telegraphic communication with Europe and other countries.

In 1879, 955 sailing vessels, with a total tonnage of 404,513, and 496 steamers, of 776,873 tonnage, entered Rio under foreign flags: of these, 292 sailing vessels, tonnage 163,137, and 255 steamers, tonnage 383,821, were British. The cargoes brought by the sailing vessels consist, for the most part, of coal, iron, and lumber; having discharged at this port, about one-third load with coffee sailing for the United States, the remaining two-thirds leave in ballast, seeking freights elsewhere.

The exports consist principally of coffee, most of which goes to the United States. In 1879 (taking the milreis at 2*s.*) the total value of the exports was £10,606,128, of which coffee represented £10,091,768. The imports, consisting chiefly of cotton, woollen, and iron goods, coal, and provisions, amounted to £9,102,932, more than one-third of which came from Great Britain.

Nitheroy, formerly the capital of the province, on the other side of the bay, has no particular feature to remark on. *Praia Grande* and *Santo Domingo* are the localities where the country houses of the people of Rio abound, and attract large crowds of people on Sundays and fête days, who come hither in numerous steamers.

A project for an iron tunnel across the harbour of Rio de Janeiro, and thus connecting the capital with the province, is now under contemplation by the Imperial Government. On the completion of the network of railways between Nitheroy and the adjoining provinces of Minas Geraes and Espirito Santo, there will be a considerable goods traffic, as this belt embraces some of the richest coffee and sugar producing districts in the country, for the conveyance of which to Rio the tunnel would be the connecting link.—*Mr. Consul Austin*, 1875.

Besides the railroad to Petropolis, there are four others, the most imposing of which is the Dom Pedro II. Railroad, which forms a direct communication with the rich province of Minas Geraes and Sao Paolo, bringing down the coffee and other products for exportation. It has now about 265 miles open to traffic.

Time Signal.—A *time-ball*, a red drum, is placed on a staff at the Observatory on Mount Castello, at the back of the town, and is dropped every day at 1 second before noon, mean time at Rio de Janeiro, equivalent to $2^{h}\ 52^{m}\ 40\frac{1}{2}^{s}$ Greenwich mean time. The drum is hoisted close up 5 minutes before the signal, and is elevated 226 ft. Position, lat. 22° 54′ 24″ S., long. 43° 10′ 21″ W.

Supplies.—All kinds of supplies can be obtained in abundance at Rio, and the port is preferable to any on the coast. Ships in want of repairs can be accommodated; there are several steam factories and building slips and docks, which will take vessels of large draught. The chief drawback is the very high price which has to be paid, and the slowness of the workmen. *Coal* is always plentiful, the price varying with the supply. The Islands of Mucangue, Pequeno, and Enchadas, are the chief coaling stations. *Water* is supplied from floating tanks, both for vessels of war and merchant vessels. The latter, calling for refreshments only, were allowed to enter the harbour without paying anchorage dues (now abolished), but are subject to all other port charges.[*]

Docks.—The dock accommodation is limited, and causes great inconvenience to vessels, in having to load from and unload into lighters, an expensive operation; this defect is, however, rapidly disappearing, the following docks being in operation. On the North side of Ilha das Cobras is the naval arsenal, with a large dock, having a length of 301 ft. over all, and 284 ft. on the keel blocks; the breadth of the entrance is 70 ft., and the depth over the sill at high water springs 25 ft. It is the intention of the Government to lengthen this dock 100 ft., and to increase its width at the bottom to 40 ft. Another dock, 250 ft. long, 28 ft. deep, and the entrance 55 ft. wide, is built alongside the above. There is also a fine commercial dock, 385 ft. long, at *Ilha das Enchadas*, with an entrance 45 ft. wide, with 18 ft. over the sill at high water springs. On the island of Macangue is a dock 45 ft. wide and 405 ft. long, and another is being made between Saude and Gamboa. Many ships now discharge at the docks constructing along the water front of the city. These, when finished, will compare favourably with any in the world.

Ilha das Enchadas, or Coaling Island, is situated 6 cables North of Ilha das Cobras, is nearly round, and about 200 yards in diameter. Off its West side a shoal extends to the westward half a cable's length; the extremity of the shoal is marked by a buoy, surmounted by a flag. There is also a patch of 21 ft. 2 cables N.W. of Enchadas. To the eastward of Enchadas, 3 cables distant, is *Baixo das Feiticeiras*, a nearly circular rocky shoal, 1¼ cable in diameter, marked by four *red* nun buoys; about 120 yards southward of the Baixo is a patch of 2 fathoms depth. *Lecky Rock* lies E. by S. ¾ S. about a cable's length from the jetty on the East point of Enchadas Island; it is 50 ft.

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[*] The port dues of Rio on shipping are:—For the maintenance of the Misericordia Hospital, where seamen and others are received gratis, 640 reis for each man, and 2 milreis for each mast; lighthouse dues, from 300 to 600 tons, 60 milreis; 6 milreis for clearances; and a stamp duty on outward freight on foreign vessels of two-tenths per cent., and four-tenths on coasting craft; in addition to certain indirect charges.—*Mr. Consul Ricketts*, 1880.

in diameter, conical, with 2½ fathoms on it at low water springs, and is steep-to on all sides; its East side is marked by a buoy.

From Lecky Rock, the chimney on Rat Island appears twice its apparent breadth to the left of the base of the eastern slope of the Sugar-loaf, and the same chimney on with the centre of the summit of the Sugar-loaf, leads between it and the Baixo das Feiticeiras in from 6 to 8 fathoms water. There is likewise a deep channel to the westward of the rock, but vessels proceeding to the coal wharves, which are situated on the North side of the island, are recommended to pass outside, or to the eastward of Baixo das Feiticeiras.

At Enchadas there is every facility for coaling. In approaching the coaling wharf it is necessary to guard against the tide. There are two or three mooring buoys for bow and quarter hawsers; the anchor is dropped in about 5 fathoms; hawsers run out and drop alongside as convenient. Vessels drawing 22 ft. lie alongside the coal wharves at low water in perfect safety.

VI.—RIO JANEIRO TO SANTOS.

GUARATIBA POINT, 25 miles W. by S. from the entrance of Rio, rises in a conical form to the height of about 800 ft., and is the southern termination of the range of mountains that surround Rio de Janeiro. There is a rock above water close to the point. From off the point, Redonda Island, with its steep shores intersected with white and dark green, off Rio de Janeiro, may be clearly seen in fine weather, as well as the Gavia Mountain, the best mark for Rio de Janeiro when approaching from this direction. At 14 miles eastward of Guaratiba Point lie *Tijucas Islets* and reefs, some of which are under water, the outermost being about 2½ miles south-westward of Point Gavia.

MARAMBAYA ISLAND, about 22 miles in length East and West, and from three-quarters of a mile to 2½ miles in breadth, is a bank of sand about 20 ft. above the level of the sea. At the West end a hill rises to the height of 700 ft., called the Morro de Marambaya, and is covered with trees; it can be seen from a distance of about 30 miles. It is said to be steep on the South side, and the sea breaks heavily on it. From *Sena Point*, the N.W. extreme of the island, a bank, having only 2 fathoms water over it, extends N.W. by N. ½ N. 3½ miles, leaving a passage about three-quarters of a mile in breadth between it and Guahyba Island into Sapetiba Bay.

From the point, at about half a mile S.W. of Sena Point, a reef extends westward about half a mile. As Marambaya Island is low, with the exception of the morro at the West end, it should be approached with caution in thick weather. *Marambaya Rock*, an islet almost bare, about 59 ft. above the sea, lies 15 miles W. ½ S. of Cape Guaratiba, and about 2¾ miles from the shore of Marambaya Island, with 9½ to 17 fathoms water all round, and 22 fathoms 1½ mile South of it.

The commander of the French S.S. *Savoie*, in 1881, reported that a cluster of rocks lie at 1 mile westward of Marambaya Rock; a subsequent search by the French war vessel *Boursaint* was unsuccessful, and it is doubtful if this danger exists.

Sapetiba Bay covers a space of about 20 miles East and West, with an average breadth of 6 miles North and South, and is protected by the Restinga or Island of Marambaya. The western part of the bay is studded with numerous islands and rocks, having deep water and good anchorage between them; the depths vary from 15 to 2 fathoms, soft muddy bottom. At the East end of Marambaya, between it and Guaratiba Point, is a passage about three-quarters of a mile wide, having 2 fathoms water, leading into the bay. With S.W. winds a heavy sea sets in, which renders the passage navigable only for small vessels of about 6 ft. draught.

Vessels bound into Sapetiba Bay should round the Morro de Marambaya at a mile westward, in 12 or 13 fathoms water, and steer for the West end of Guahyba Island, about 8 miles to the northward, in not less than 5½ fathoms, or by keeping a little westward a vessel will have deeper water. When about half a mile from the South point of Guahyba, steer N.E. by E. ½ E., leaving the Jaguanao group on the starboard hand, and carefully avoiding Enchadas Rock, which lies half a mile W. by N. from Carapuca Islet; then steer for Pedro Branco, a white rock on the South side of Tacuruzâ, which may be passed close-to on the South side in 9 fathoms water.

From Pedro Branco steer to pass half a mile southward of Maria Miz Island, to avoid the reef off its S.W. point, and then haul gradually up in from 5 to 7 fathoms water, for the anchorage under the South side of Madeira Island. Vessels may also anchor southward of Pedro Branco; northward of the Jaguanao group, or westward of them; and vessels of light draught in any part of the bay.

Mangaratiba Bay, about 2 miles deep and 1 mile wide, lies on the main, 12 miles N. by E. of Castelhanos Point, the East extreme of Ilha Grande, or about N.W. by N. of the Morro of Marambaya. Here is a village and church, and a vessel may anchor in 3 to 5 fathoms water. Vessels going into this cove should be careful to avoid Flat Rock, lying 1½ mile W. by S. from the South point of Guahyba Island. The rock is just awash, steep-to, and most dangerous in hazy weather.

ILHA GRANDE is in the form of a triangle, with its greatest side, 17 miles long, to the southward. It is high, and covered with verdure to the water's edge. Some parts of the island have been cleared, and are under cultivation, but the greater portion is a dense mass of trees and underwood. On the N.E. side of the island are *Palmas*, *Albrahao*, and *Estrella Bays*, affording anchorage for the largest vessels in 6 or 7 fathoms water, muddy bottom, and where water, fruit, yams, pigs, and fowls may be procured. Steam vessels short of fuel may obtain an abundance of wood in Palmas Bay; the necessary permission for cutting it should first be obtained. *Sitio Forte Bay*, on the N.W. side of the island, has good and well sheltered anchorage in 9 to 10 fathoms, blue clay, and fresh water, fruit, and fish can be easily obtained here.

At about 5½ miles westward of the East point of Ilha Grande is the bay and village of *Dois Rios*. There are two islets in the bay with anchorage inside them for small vessels. About 2 miles southward of the East point of the bay is *Jorge Griego Island*, said to be steep-to, with a bay on its North side, affording anchorage for large vessels. A heavy swell sets towards the island.

ILHA GRANDE BAY.—This magnificent bay, in the entrance to which lies the island of the same name, is about 17 miles from North to South, and 12 miles from East to West, and having an average depth of 10 fathoms. In the northern part of the bay lies *Gipoia Island*, surrounded by clusters of smaller ones, which have many outlying rocks and dangers; the outer island of this group is called Coronel, 3 miles from Gipoia Island, small, and having a sunken rock 4 cables to the westward of it. The shores are thickly studded with rocky islands, with outlying sunken rocks, the most important of which is *Meros Shoal*, a patch 3 cables in diameter, lying nearly in the centre of Ilha Grande Bay; the depths around this shoal are from 8 to 11 fathoms; the depths in the entrance of the bay are from 19 to 21 fathoms. At 1½ mile S.S.W. of Point Acaya, the West point of Ilha Grande, is a recently-discovered rock, 21 feet under water; and between this and the point is a second rock. Many small streams empty themselves in Ilha Grande Bay, and in its western part shoal banks extend a considerable distance from the shore.

At about 9 miles W.S.W. from the West end of Ilha Grande is *Joatinga Point*, forming the S.W. extreme of Ilha Grande Bay. The point is high, and may be approached at a prudent distance. At 5½ miles to the S.W. ½ W. of Joatinga Point is that of Cairoçu, about 11 miles westward of which, and 2½ miles inland, is the *Peak of Parati*. To the northward of *Grossa Point*, which is 25 miles W. by S. of Point Cairoçu, is the *Bay of Ubatuba*, in which there is anchorage in 3½ fathoms off the town of that name, 1½ mile distant. Only small vessels can use this road, and fresh provisions are scarce. Several small islets lie off this coast.

Porcos Island.—At 4½ miles southward of Grossa Point is Porcos or Hog Island, moderately high, about 2½ miles in length, and 1½ mile in breadth. Off its South point is an islet, with a boat channel between, and two other islets lie off its East side. On the North side of the island is *Palmas Bay*, with a village at its head, nearly a mile in breadth, and about three-quarters of a mile deep, where vessels may anchor in 4 fathoms water, muddy bottom. The bay is sheltered from all winds except those from N.E. to E. by N., which seldom continue long enough to cause a heavy sea, and is an excellent place for a vessel to refit.

In running for Palmas Bay, strangers will find the island a little difficult to make out, owing to the high land northward of it; but as the water is deep close-to, there is no danger in standing on until the white house on the N.E. end of the island is seen; passing inside, between, or to the northward of the islets. There is no tide here but what is caused by the prevailing winds; the rise is about 3 ft.

Water is plentiful, and easily obtained from the S.E. part of the bay. There are several villages on the mainland, where fresh beef and stock may be obtained.

Flamingo Bay.—The N.W. point of Porcos Island forms, with a point projecting from the mainland, a narrow channel rather more than a quarter of a mile in breadth, carrying 16 fathoms water, through which vessels can pass when the wind is steady by not keeping too close to either point into Flamingo or Shark Bay. This bay is about 2 miles deep, more than 1½ mile in breadth, and has good anchorage in 5 to 7 fathoms water, except with southerly winds which bring in a heavy swell.

There is anchorage for small vessels, soft bottom, on the southern side of a cove at the N.W. part of the bay. The village of Flamingo stands in a small bight on the West side of the bay. From Flamingo Bay the coast trends to the S.W. for about 20 miles to Arpour Point, westward of the N.W. point of St. Sebastiao. The shore has several indentations, backed by high land, and with the North side of St. Sebastiao Island forms a deep bay, open to the eastward, called Barra das Canaveiras.

Vittoria Island.—At nearly 4 miles eastward of the N.E. end of St. Sebastiao Island is that of Vittoria, 2½ miles long East and West, and 1 mile in breadth. Southward of the West end of Vittoria are two small islets or rocks, surrounded by a reef which extends about 2 miles S.S.W. from the island. The *Busios* are two islets, appearing like three at a distance, lying S. by E. ¼ E. 11 miles from Porcos Island, and north-westward 6 miles from Vittoria. The passage between these islands, except the reef southward of Vittoria, is free from danger. There is 17 fathoms water 25 yards from the Busios.

ST. SEBASTIAO ISLAND is about 14 miles in extent each way, and its mountains are as high as those of the mainland, from which it is separated by a channel from about 1 to 3 miles in breadth. The island may be seen in clear weather from a distance of 45 miles; it is nearly covered with wood to its summit, and its shores are steep-to; it has several waterfalls and some scattered houses, which have a pleasing effect. The eastern side of the island extends nearly North and South, and from the S.E. point the southern side runs about W. by N.

Villa Nova da Princeza, off which is the usual anchorage, stands on the western side of the island, at 3¾ miles from the North point. The town consists of a couple of streets and a few detached houses, with a church built on the rising ground at the back of it; a dilapidated fort stands near the beach. The old town of St. Sebastiao is on the mainland, at 2½ miles to the S.W. of Princeza.

ST. SEBASTIAO CHANNEL.—The channel of St. Sebastiao affords a roomy and safe anchorage for the largest vessels, and there is almost always smooth water in it. The western side of the channel, or that of the mainland, is bordered by a bank, having over it from 1 to 3 fathoms water. From Arpour Point, westward of the N.W. extreme of the island, the bank extends off about 2 miles, and terminates at a point 1 mile southward of the town of St. Sebastiao.

Vessels bound into St. Sebastiao Channel from the northward, when at half a mile westward of the Armaçao, at the North part of the island, should steer S. by W. ½ W. along the island side at the distance of about half a mile in from 10 to 20 fathoms. Off Villa Nova da Princeza the depths are 13 and 14 fathoms, gray sand. The southern channel may also be used if convenient, so that a vessel may leave by either channel according to the wind. The winds at St. Sebastiao during the day blow nearly always from N.N.E. or S.S.W., following the direction of the channel, but frequently interrupted by calms. At night the land wind is variable.

There are several watering places at St. Sebastiao; one of the best is between Villa Nova da Princeza and the Armaçao at the North end of the island; the water is good and easily obtained. Cattle, poultry, spirits, and fruit may be procured at a moderate price. On all the coast of the main land firewood is abundant. Fishing is seldom productive, but the fish are of good quality.

It is high water, full and change, at St. Sebastiao, at 2^h; springs rise 4 ft. The tides are irregular. The current follows the direction of the winds, and within the channel runs about three-quarters of a mile an hour, and occasionally 1¾ mile an hour.

The coast from the southern entrance of St. Sebastiao Channel is formed by the high land curving to the northward; and at the distance of 48 miles W. ¾ S. from Sapitiba Point, the S.W. extremity of St. Sebastiao, is Moela Islet, near the East side of the entrance to the port of Santos, on which is the light hereafter described. In the bay thus formed, at 17½ miles from St. Sebastiao Point, the West extreme of that island, and 5¾ miles from the shore, is *Monton de Trigo* or *Corn Stack Island*, high, nearly conical, and wooded to the summit. At 2 or 3 miles around it, and at the same distance from the coast, the depths are from 12 to 25 fathoms, muddy bottom.*

Alcatrasses Islands.—At the distance of 14 miles S. by E. ½ E. from Monton de Trigo is a barren group, called Alcatrasses or Cormorant Isles, the largest of which may be seen from a distance of 30 miles. When bearing E.S.E. it has the form in which painters represent a dolphin, with its head to the W.S.W. At 2 miles W.N.W. from the N.E. end of the largest islet is another islet, and at the same distance to the N.E. are two or three others. These latter islets are low. It is not prudent to approach this group nearer than 4 or 5 miles, as the bottom in the vicinity is stated to be foul, and the currents uncertain. From the N.E. islet Sapitiba Point bears N.E. by. E. distant 15 miles, and Moela Islet W. ¼ N. distant 34 miles.

SANTOS HARBOUR is formed on the East by the Island of St. Amaro, which is separated from the main by a small river, the Bertioga, navigable for boats; and on the West by the Island of Engua Guaçu. The entrance to the Bertioga round the East end of St. Amaro is called Barra de Bertioga. Manduba Point, the South end of the island, forms with Taypu Point, at nearly 7 miles W. ¼ N. of it, the extremes of Santos Bay. The bay is about 3½ miles deep, has depths of 4 to 10 fathoms, and on the East side is the principal entrance to the harbour, where vessels may lie sheltered from all winds except those from south-westward.

The Bay of Santos is easily known; Taypu Point being the westernmost high coast land for some distance, the coast immediately West of it being low and flat to the base of the mountains for about 10 miles inland; while all Santos Bay is surrounded by a succession of steep hills of moderate height, broken here and there, chiefly at the North side of the bay, into small low beaches.

The city of Santos stands on the West side of the harbour, on the North side of the Island of Engua Guaçu, about 37 miles south-westward of Sao Paulo. It is well built, has two churches, convents, a well-managed hospital, and building slips, with a population of about 15,000. A handsome custom-house has been built, and the city is now well supplied with water, is lighted with gas, is partly drained, and has tramways in the principal streets. In fact, it has been making rapid strides in the last few years, during which its trade has much increased. Its situation is unhealthy, the country around being low, woody, and frequently deluged with rain. The yellow fever season here usually commences between February 1st and the end of April, lasting two or three months. A line of steamers runs between Santos and Rio de Janeiro twice a week.

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* In noticing this quality of ground, it may be here observed that, on the coast of Brasil, the bottom of oaze or soft mud is almost always found near the high lands.—*Roussin.*

The city of *Sao Paulo*, about 40 miles inland, and connected with Santos by railway, is the capital of the province of Sao Paulo, and has a population of about 35,000. It is the centre of the provincial railway system, which had a total length of 710 miles in 1879, and is connected with Rio Janeiro by railway. The population of the province, which has an area of 91,000 square miles, amounted to 837,354 in 1875, and is steadily increasing with the prosperity of the country.

The exports from Santos consist principally of coffee, cotton, rice, hides, and tobacco; the value of coffee and cotton exported in the year 1879-80 amounted to £2,469,908, about nine-tenths of which was coffee. In the year 1880, 355 vessels, with a total tonnage of 309,107, visited Santos, of which 128, with a tonnage of 111,717, were British.

The entrance to the harbour is commanded by a fort on either side about 2 cables apart. From *Barra Fort*, a large white building on the South side, the harbour extends eastward about a mile, when it trends to the N.N.W. for 4½ miles to the anchorage off the town. The harbour is narrow, with 4½ to 11 fathoms water, and deepest along the East side. On the eastern shore, close up to the town, is a small fort on a barren rocky point, off which the depth is 12 fathoms. At 72 yards off the South bluff of Outeirinhos is a sunken rock, which had been blasted to a depth of 16 ft. in 1879.

At Santos all necessary supplies may be procured in abundance, and at moderate prices. Rock oysters of good quality may be gathered. Water is purchased, or boats may be sent 5 or 6 miles up the river for it, where there is a deep clear pool of fresh water.

Three red buoys mark the entrance to Santos Harbour, namely, one on the South side, 3 cables W. by N. from Fort Barra, and two on the North side, lying E.S.E. and W.N.W. from each other 2 cables apart; the inner of the two on the North side is 2 cables distant from Fort Trinxheira. These buoys are liable to shift during south-westerly gales.

Vessels requiring pilots can obtain them from the village of Barra by making the usual signal. Their charges are moderate.

Light.—On *Moela* (Gizzard) *Islet*, a mile S.E. of Manduba Point, is a white tower, 40 ft. high, which exhibits at the height of 334 ft. above high water a *fixed bright* light, visible 24 miles in clear weather. It has been reported that the light is only visible 12 or 14 miles, and that a small light is shown on Barra Fort.

Directions.—After passing Moela Islet, steer along the land, giving Palmas Islet, which is low, with a few bushes on it, a berth of one-third of a mile, and haul gradually to the northward and eastward. When the fort is well open, steer with it on the starboard bow, keeping northward of the line of the points, to clear the bank extending along shore from Barra Fort to the point

S.W. of it, the least water will be 4 fathoms. Pass close to the rocky point under the fort to avoid the spit extending from the low sandy point on the North side, then steer rather on the southern and eastern shore, when a remarkable perpendicular rock* on the western shore will be seen above the trees, which steer for, and pass moderately close.

The route will then be towards the fort, from abreast of which steer for the town, giving a berth to the low point East of it, and anchor when abreast of the first landing-place in 5½ fathoms, soft mud. Small vessels lie alongside the quay; large vessels anchor about three-quarters of a cable from the shore opposite the flagstaff of the captain of the port. Vessels of war anchor more to the eastward, the sea breeze being stronger there. A mud bank extends from the fort point to that of Ilha de Carvalho, narrowing the channel and anchorage.

It has been proposed to construct wharves here, which are much required, vessels having often to remain weeks before they can obtain a berth at the wretched little jetties now used, where they ground at low water on the mud. —*Mr. Consul Cowper*, 1881.

The tides are strong, particularly the ebb. It is high water, full and change, at $2^h\ 50^m$; springs rise 5 feet.

Lagé de Santos.—At 16 miles S. by E. ½ E. from Moela lighthouse is the Lagé of Santos, a level barren white islet about 70 ft. high, and E.S.E. of it, distant about 1½ mile, is a reef of rocks which appears 6 or 8 ft. above the sea; also on the western side of the Lagé, at three-quarters of a mile distant, there is a rocky shoal separated from it by a deep passage. There are some mineral springs on the islet.

Lagé of Conceiçao.—At 7 miles S.E. by E. from the village of Conceiçao, and 15 miles northward of the Queimada Grande, is a rocky islet about 16 ft. above the sea, which appears a little larger than a vessel's launch. About three-quarters of a mile from it there is 12 fathoms water, mud and sand. At 6½ miles S.W. by W. from the Lagé is *Conceiçao Rock*, about 40 or 50 yards in extent, with 26 ft. water over it; it breaks with fresh winds from S.E. to S.W.

QUEIMADA ISLETS lie N.W. and S.E. of each other, 10 miles distant. The *Little Queimada*, the nearest to, and about 9 miles from the coast, is a small round and conical islet, thickly wooded, and visible at a distance of 20 miles. It is 10 miles S.W. ½ S. from the Lagé of Conceiçao. The *Queimada Grande*, 623 ft. high, is said to be nearly 2 miles in length, North and South, with a reef extending from its northern end, and is visible from 30 to 35 miles. The islet is nearly barren, with its highest part to the S.W. appearing round. From the southward and eastward it shows as two peaks of nearly equal height, and is a good mark for making Santos.

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* Navigating Sub-lieutenant G. T. Ralph, of H.M.S. *Beacon* in 1871, stated that this rock is so much overgrown with bushes that it cannot be distinguished until close-to; but by keeping the northern Ontario mound just open to the eastward of the southern one will lead in mid-channel, and the perpendicular rock will be found right ahead, on approaching it.

VII.—SANTOS TO THE RIO DE LA PLATA.

Having described the islets in the offing off Santos, we now proceed with the coast from Santos southward.

From Taypu Point, the West extreme of Santos Bay, the shore trends to the W.S.W. for 23 miles to the village of *Conceiçao*. The shore is generally low, backed by a chain of high mountains at the distance of 12 or 15 miles inland, which here and there branch towards the sea, and appear from a distance like islands. At the distance of 12 miles S.S.W. from Taypu Point is a small bank with only 9 ft. water on it, lying in the way of vessels from the southward bound to Santos, and discovered by the Brasilian war-steamer *Don Pedro Secondo*. This shoal, however, is not marked on the chart of the coast by Captain E. Mouchez, who surveyed it in 1868. Conceiçao stands on rising ground near the beach, and at 4 or 5 miles from it there is 9 and 11 fathoms water. From hence a low sandy shore continues to the S.W. by W. for 14 miles to the heights and creek of Piruibe, where it takes a southerly turn for about 5 miles to Guarahu Point and islets.

From the latter point the shore trends to the S.W. ¾ W., and at the distance of 14 miles is Jurea Point, with the bar of the River Una between. At 11 miles farther on is the bar of the River Iguape; and about 5½ miles farther is the entrance to the Mar Pequiña de Iguape, which admits boats into that sea. The soundings along shore generally increase in depth, according to the height of the land; at from 3 to 10 miles off there is from 7 to 13 fathoms water. Temporary anchorage will be found at any convenient distance from the shore.

Mar Pequina (little sea) is a narrow lake or channel running parallel with the shore from the bar of Iguape to Cananea Bay, a distance of about 30 miles. The town of *Iguape* stands on the West bank at 4 miles from the entrance; the sea is divided at the S.W. part by the Island of Cananea, and it has depths of 4 to 6 fathoms. *La Praya* or Beach of Iguape, the island which forms the sea, is a chain of low sandy downs, interspersed with brushwood, and can be seen only for a short distance. It should, therefore, be approached with caution, and in foggy weather not nearer than 6 miles, in 9 or 11 fathoms water, sandy bottom.

Mount Cardoz, at about 15 miles W.N.W. of the Isle of Bom Abrigo, is the highest and most remarkable mountain on this part of the coast; but notwithstanding the proximity and height of the chain of mountains, of which it forms a part, the fogs that sometimes prevail on this part of the coast during the southern monsoon prevent the land from being seen.

CANANEA BAY, at the southern entrance to the Mar Pequina, is formed by an island southward of La Praya or sandy beach of Iguape, and which is separated from the main by a small rivulet called Ararapira. The bay is large, and affords well-sheltered anchorage. The islet *Bom Abrigo* lies at the entrance; it is high, covered with trees, and its two extremes are more elevated than the centre; there are several shoals, on which the sea breaks, northward of it, at the entrance to the bay, and a smaller islet lies on its th side. At 2 miles eastward of it there is 11 and 12 fathoms water, sandy bottom. A town stands about 7 miles westward of Bom Abrigo. Large vessels are built here.

The entrance to the bay will be known by Mount Cardoz. The northern channel is generally used, but the southern one is the deepest; and about midway between Bom Abrigo and the shore West of it is anchorage in 5½ or 6 fathoms water. A pilot into the bay is necessary.

There is a well-protected anchorage westward of Bom Abrigo Island in 4 fathoms, sand, about 3 cables from the island shore. The best entrance to this anchorage is southward of Bom Abrigo, which may be rounded in 7 fathoms, at a distance of 2 cables. Off the North end of the island there are apparently several shoals on which the sea breaks. H.M.S. *Mallard* crossed Cananea River bar a little before high water, and found the least depth to be 15 ft. The town of Cananea is 6 miles distant, and Port Colonia is about 12 or 14 miles from the anchorage off Bom Abrigo. Competent pilots for crossing the bar can only be obtained at Cananea.—*Lieut. H. B. Lang*, 1879.

Castillo and Figueira Islets.—The coast from Cananea Point on the South side of the entrance to Cananea Bay continues low and sandy to the S.W. for about 32 miles to the entrance of Paranagua Bay. A small islet lies off Cananea Point. At about 11 miles from Bom Abrigo Islet, and nearly opposite the bar of Ararupira, is *Castillo Islet*, 32 ft. above the sea. The islet takes its name from a ridge rising from its centre, which, at a distance, resembles a castle. At 7 miles S.W. from Castillo is *Figueira Islet*, 160 ft. high, in the form of a fig. Both these islets are nearly barren. They may be rounded closely, and at 1 mile seaward there is from 10 to 15 fathoms water, on fine sandy bottom.

The water which issues from the Bay of Paranagua carries with it alluvial deposits, which diminish considerably the depths outside, but not so much as to affect navigation. At 6 miles from the entrance there is from 5 to 8 fathoms water, on gray sand and mud.

PARANAGUA BAY.—This magnificent bay, which is twice as large as the Bay of Rio de Janeiro, is a deep inlet or gulf, running westward and northward, with the land broken in every direction within a circuit of about 15 miles. It is surrounded by forests, and receives the waters of many small rivers and rivulets. The entrance, in lat. 25° 30′ S., is sheltered, and divided into two channels by *Ilha do Mel* (honey), a low island, on which are several hummocks, appearing at a distance of 7 or 8 miles like islets.

Between the island and the North point of entrance are three little islets, covered with palm trees, named *Palmas*, about 130 ft. high, with several rocks extending westward. Connected with Palmas Islets is a triangular-shaped bank, called *Barra de Paranagua*, which extends from the islet 3¾ miles to seaward; its South corner is marked by a *red buoy*, moored in 4½ fathoms water. On either side of Barra de Paranagua is a channel into the bay; the *North Channel*, seldom or never used, is bounded on the North by the *Barra Superaguy*, and has a depth near the entrance of 16 ft. at low water; there is generally a heavy swell in it, and at times the sea breaks.

The *South Channel*, half a mile wide, is the only one used; it is formed between the S.W. side of Barra de Paranagua and a bank extending 3 miles to the S.E. of Isle do Mel; the depths in it are from 8 to 3 fathoms. It has been stated that the latter bank extends farther seaward than is marked on the chart. At 6 cables E. ½ N. from the fort on Isle do Mel, and N.W. by W. ½ W. about the same distance from Palmas Islets, is a circular patch of rocks about 2 cables in diameter, called *Balcas*, some of which cover at high water. At 3 cables N. ½ W. from Balcas is *Caxoes*, a small island surrounded by a reef; a sunken rock lies 3 cables N.E. by E. from Caxoes.

The Island of *Raza da Cotinga*, about 3¼ miles in length nearly East and West, and 1 mile in breadth, with *Cotinga Island* running parallel to it on its north-western part, lies on the South side of the inlet, at about half a mile from the main, and leaving a space between them and Ilha do Mel of about 1¾ mile. An islet lies in the southern entrance, and the channel being dry at low water is not navigable. The general depths in the southern part of the inlet are from 2¾ to 10 fathoms; and in the channel northward of Cotinga 4 to 10 fathoms.

The town of Paranagua, which is of some importance, stands on the main southward of the West end of Cotinga, and on the West side of a small creek, which has from 6 to 12 ft. of water in it. It has a criminal court, four churches, a town-hall, with prison attached, a Jesuit college now used as a custom-house, a theatre, a hospital, and some schools. The principal article of export is Maté, or Paraguay tea. Formerly fishing was extensively carried on in the bay; this is now only followed up for local supplies. The population in 1871 was about 7,000. The town next in importance is *Antonina*, situated at the head of the western arm.

Lights.—On *Conxas Point*, the East point of Isle do Mel, is a white iron lighthouse, 69 ft. high, which exhibits, at an elevation of 262 ft. above the sea, a *fixed bright* light, visible 20 miles in clear weather. Here is the pilot-house and flagstaff.

A *fixed bright* light, elevated 47 ft. and visible 6 miles, is also shown from a lighthouse, 30 ft. high, on Isle do Mel fort, visible when bearing between N. by W. ⅓ W. and S.E. by S. ⅔ S.

Directions.—In approaching Paranagua Bay from the eastward, when 30 miles distant, three peaks, not far apart from each other, will be sighted nearly ahead; and on a nearer approach the round islet of Figueira will be seen; also the hillocks on Isle do Mel and Palmas Islets, surmounted by trees. Shoal water extends 8 miles to the N.E. by E. of Conxas Point, and 5 miles southward of the same. Vessels should bring the lighthouse on Conxas Point to bear N.W., and should not shoal less than 6½ fathoms until the lighthouse is on that bearing. Steer for the lighthouse on a N.W. bearing, which will lead up to the red buoy near the South corner of Barra de Paranagua; when at a convenient distance from the buoy the vessel should signal, and wait for the pilot, who will come off from Conxas Point. It is advisable, when seeking the bar, not to pass to the North of the buoy, but to the South, very close to it, in order not to touch on the other bank, which lies to the S.W., distant 1 mile.

With S.E. winds the entrance presents a continuous line of breakers. The pilots seldom board until the vessel arrives within the bar; attention, how- should be paid to the signals which will be made from the pilot boat, will indicate the proper track by inclining a flag either to one side or the other. The pilots, in 1871, stated that the water on the bar was shoaling.

From this buoy a course N.W. ½ N. will lead across the bar in 2¾ fathoms at low water, in 5 to 6 fathoms to Conxas Point, and in 8 to 12 fathoms from Conxas Point to the fort on the East side of Isle do Mel, which is in lat. 25° 30′ 57″ S., long. 48° 19′ 29″ W. Pass about 4 cables distant from Conxas Point and 3 cables distant from the fort, between the latter and Balcas Rocks, partly covered at high water. A rock, about 6 ft. high, lies a cable distant from the shore abreast the fort, having 10 fathoms close-to. After passing this rock, keep about 4 cables distant from Isle do Mel; when abreast the West point of this island, steer for the North part of Cotinga Island, passing about 3 to 4 cables North of it. Ilha das Cobras is high and wooded.

Merchant vessels anchor near the town of Paranagua, in a creek which admits vessels of 500 tons. A mud flat extends from the main across the creek, leaving only a narrow channel, which is marked by beacons. Small craft get close up to the town.

It is high water, full and change, at Paranagua, at about 3^h; springs rise 6½ ft. The tides at the entrance, and in the Bay of Paranagua, are very irregular, being much influenced by the winds from the eastward, and therefore of a greatly varying force. With strong winds from the eastward, the flood coming in will last often 2 or 3 hours longer than the ebb. Its velocity is 3 and 4 knots an hour. There is another phenomenon called *medias marés* (half-tides), where flood and ebb run only 3 hours, and the velocity only 2 and 3 knots, and even less. Strong winds may be looked for at the changes of the moon.

River Guaratuba.—At about 23 miles south-westward of Ilha do Mel is the bar of the Guaratuba, a rapid river, navigable for small vessels to about 8 miles from its mouth. The coast between is bordered by a bank, extending 4 or 5 miles seaward, over which boats only can pass. On the edge of the bank, about 10 miles southward of Ilha do Mel, are the three *Cural Islets*, the largest of which is 64 ft. high; and at 5 miles more to the southward are three islets called *Itacolomi*, 21 ft. high. At from 1 to 2 miles eastward there is 9 to 11 fathoms water, sand and mud.

At 18 miles S. ½ E. from Guaratuba Bar is *Cape Joao Diaz*, the North extreme of San Francisco Island, high, bold, and easily known, and which forms the southern point of entrance to the river of the same name. At 2 miles eastward of it are Graça Islets, the largest of which, Ilha do Paz, is 223 ft. above the sea; and at three-quarters of a mile N.E. from the cape is a sunken rock, with 16 ft. water over it. These islets and rocks, ten in number, extend North and South over a space of 2 miles, with 4½ to 7½ fathoms water between them and the coast. The northernmost islet is on the parallel of Cape Joao Diaz.

The shore between is flat, and the surrounding country of little elevation, but distinguished by some remarkable hills, and at some miles in the interior are the Serras de Maratubu, a chain of high rugged mountains. At 6 miles from the coast N.N.E. of San Francisco River there is 9 fathoms water, fine sand.

RIO SAN FRANCISCO DO SUL falls into the sea by two mouths formed by the island of the same name. The *Aracary* or *South Channel*, carrying

1½ fathom water, is dangerous, being obstructed by a shifting sand-bank, over which the sea breaks with violence. The *North Channel*, more than a mile in breadth, called *Bobitanga* or *San Francisco*, is navigable for moderate-sized vessels. The bar has from 16 to 20 ft. water on it, the shallowest part being near its South end, and extends from about three-quarters of a mile eastward of Cape Joao Diaz, in a N.N.W. direction for more than 2 miles across the mouth of the river, leaving a channel between its North end and the bank bordering the shore, having from 23 to 26 ft. water.

The *Island of San Francisco* is of a triangular form, about 18 miles in length in a North and South direction, and about 10 miles in its greatest breadth; it is generally flat, and watered by numerous streams. *Cape Joao Diaz*, the North point of the island, is 470 ft. above the sea; at three-quarters of a mile N.E. of the cape there is a sunken rock with 16 ft. water on it. The Morro Itamirim, 557 ft. high, is 1½ mile S. by W. of Cape Joao Diaz, and is the highest land on this part of the coast North of Itapacoroya Point.

The town of San Francisco (Nossa Senhora da Graça) stands on the N.W. side of the island, about 9 miles from the bar. It is small, and of little importance; it has hardly any trade, is not open to foreign commerce, and is in a dilapidated state. San Francisco is entirely without fortifications. On the banks of the River Saguasu, about 12 miles from the town of San Francisco, is Colonia, a thriving German settlement, numbering about 7,000 people. Their principal trade is in wood, which they send to Monte Video and Buenos Ayres.

The land winds blow from S.W. to W.S.W. from March to September, and during the remainder of the year from W.N.W. to N.W. The winds from N.E., S.W., and West raise a sea, but it goes down as the wind dies away.

Tides.—It is high water, full and change, at San Francisco at 2^h 30^m a.m.; springs rise about 6 ft., and neaps 4½ ft. At springs, with South and S.E. winds, the banks are sometimes overflowed.

Directions.—The River San Francisco should be entered with caution, and the sea on the bar should be taken into consideration. When the wind and tide are contrary, the sea is heavy even in fine weather, and inside the bar, in from 8 to 12 fathoms water, it is most disturbed. It is therefore always prudent, before entering the river, when it is contrary to the wind, to wait for change of tide, so as to have smooth water.

Steer in with Cape Joao Diaz bearing about S. by W., keeping the lead going, and when at the distance of 3 miles from the cape, steer West until its East extreme is in line with the Morro da Enciada, at 3½ miles to the S.S.E.; then keep on this line until a long mile from the cape, or the river is well open; but the North point of entrance should not be brought westward of S.W. by W. ¾ W. until well inside the cape, in order to avoid a shoal patch with 23 ft. water on it, at nearly three-quarters of a mile N.N.W. of the cape. Then keep in mid-channel, giving Cape Joao Diaz a berth of about three-quarters of a mile, and avoiding the bank which extends seaward from the North point. Within the bar the water gradually deepens. The shoal part of the bar on the South end is marked by two *red* buoys, the shoalest water lying between the buoys.

After passing the North point and breakers at a convenient distance, a group of islets will be visible. Steer along the N.W. shore with the islets ahead until the town of San Francisco is seen; then steer toward and anchor off it. The best anchorage for large vessels is in 9 fathoms, with Pedras Point, southward of Cross Point, E. by N. ½ N., and the church S.E. by E. Smaller vessels may approach the shore to 5 fathoms, muddy bottom, with Pedras Point N.E., and the church S.E. by E.

Three rocks, all awash at low water, lie to the westward of the town; each one is marked by a *red* buoy, surmounted by a staff and ball. A small 14 ft. shoal, shells and gravel, is reported to lie 3 cables S.W. ¼ W. from Cross Point. A rock, marked by a *black* buoy, lies N. ½ E. about 9½ cables from Cross Point, and directly in the track. At 3½ cables N.W. of this there is another detached rock near the North shore. A *red* buoy marks a shoal 4 or 5 cables N.E. of Cross Point, and there is a buoy on a shoal close off the town.

Outer Anchorage.—Vessels not wishing to cross the bar, or waiting for a pilot, will find good and well-sheltered anchorage to the westward of Graça Islands.

At 12 miles southward of Graça Islets is another group, called the *Tamboretes*, at about 2 miles from the shore. At 5 miles S.S.W. of the latter islets are *Remedios Islets*, lying S.E. of the entrance to the Aracary or southern channel of San Francisco, and between 3 and 4 miles southward of them is the *Lobos Tapilinga* group. All these islets are covered with trees, and it is said that small vessels only can pass between them and the shore. From the Aracary the low shore runs to the southward, curving westward for about 23 miles to Itapacoroya Bay.

Itapacoroya Bay is formed, in lat. 26° 46′ S., by a projection of the coast, in an East and North direction. The north-westernmost point of this promontory is named *Jurubatuba Point*, 2¾ miles N.W. ½ W. from which is Feia Island, 229 ft. high, with rocks extending 2 or 3 cables from its East end. At 3 miles North of Feia Island is *Pedres Islet*, 16 ft. high. At 1¾ mile E. by S. ½ S. from Jurubatuba Point, and nearly 1 mile from the nearest land, is *Itapacoroya Rock*, which breaks. The anchorage, 1 mile W.S.W. from Jurubatuba Point, is in about 5 fathoms water, mud bottom, and good holding ground. Small vessels lie sheltered close in to the village more to the southward, near some piles formerly used when this was a great whaling station. A disagreeable sea sets into the bay with N.E. winds. The head of the bay is shallow, and from the village along the beach towards Feia Islet are numerous reefs, which do not show with smooth water. Anchorage will also be found on the S.W. side of Feia Islet, and rather better than in the bay. All kinds of refreshments can be procured at the village.

The entrance to the *River Tojahi*, about 8 miles southward of Itapacoroya Point, is formed on the South by *Cabessado Point*, a rocky bluff, whilst the North point is low, sandy, and forms a narrow spit, over which the sea breaks, and which contracts the entrance. Capt. Stenzel, German war vessel *Albatross*, visited this place in October, 1873, when the spit was marked by a buoy. The passage, narrow and difficult, is on the South side, and 2 fathoms is the least water carried in, where a vessel will find smooth water, and sheltered from all winds. The water deepens to 3¾ fathoms near the town, where fowls, &c. may be obtained, and to which the telegraph is extended. The best anchorage is abreast the church, a little above the town.

It is high water here, on full and change, at 2^h; springs rise 2⅔ ft. and the surface current always ran out The country is fertile, and a considerable trade is carried on in wood.

Cambriu, 12 miles South of Itapacoroya, like most of the anchorages on this part of the coast, is open to the north-eastward, but sheltered from all other winds; the bottom is a mixture of sand and mud. The river of the same name is narrow, the bar shallow, and can be crossed only by small coasters. In entering, be careful to avoid a rock of 3 ft., which lies 2 cables to the North of the eastern point of the bay, and anchor in 3½ fathoms W.S.W. from the extremity of the point, and S.E. by E. from Cabras Islet.

Ganchos Bay.—This small bay, in the South part of that of Tijucas, affords good anchorage, and water, fresh beef, and stock may be procured from the village. It will be easily known, as it lies under the high sugar-loaf peak named *Mount Ganchos.* Small vessels may anchor here in 3½ fathoms water, mud, completely land-locked. In entering or leaving this bay care should be taken to give a good berth to Ganchos Point, as a reef of rocks extends half a mile to the northward, on which the sea breaks only at times. To the northward of Tijucas Bay is the bay of *Porto Bello.*

There are several small islets lying about 15 miles eastward of the entrance of Tijucas Bay, and 6 or 7 miles northward of Santa Catharina; the largest, *Arvoredo*, is high and wooded, with an islet, called Deserta, 1½ mile from its eastern side; it is a good mark for this part of the coast. There is anchorage in the small bay on the S.W. side of the island in 11 fathoms water, mud. At 3 miles W.N.W. of Arvoredo, and between it and the North point of Tijucas Bay, are the *Penedos San Pedro*, two rocks with a breaker half a mile S.W. by W. of them; and about 4 miles northward of them, and nearly the same distance from the shore, is the islet of *Pedra de Gale*, remarkable by long white streaks on its steep side, as well as by two rocks which lie off its N.E. end.

Light.—A circular red lighthouse is erected on South Point, *Arvoredo Islet*, and from it a light, elevated 350 ft., will shortly be shown. This will be a valuable guide to the port of Santa Catharina at night.

The channels between these islets and rocks are safe, the depths varying from about 8 to 18 fathoms, over oaze and gray sand. At about 15 miles from the coast the depths are from 18 to 24 fathoms, and on the parallel of 26° 44′ S., long. 48° W. there is a bank with 12 and 14 fathoms water over it, discovered by H.M.S. *Volage*, in 1831.

The *Province of Santa Catharina*, which includes the island of that name, is about 230 miles long North and South, and 60 to 200 miles broad, with an area of 14,700 square miles, and a population of about 170,000 in 1878.

SANTA CATHARINA ISLAND, separated from the mainland by a narrow channel, which forms an excellent harbour, lies nearly North and South 28 miles in length, and at its North end is 10 miles in breadth It is high, with its greatest elevation to the southward, and on approaching from the eastward appears much intersected by deep valleys; it can be seen from a distance of 45 miles; but the mountains of the mainland are higher, particularly the morro of *Camborella*, a branch of the eastern Cordillera. About its middle, on the eastern side near the shore, is a lagoon, which has an entrance from the sea; it separates the mountains, and forms a conspicuous opening.

The eastern coast is high, clear of danger, and may be approached at a prudent distance. There are several small islets off it, which may be seen at a distance of 9 miles; these are the *northern Moleques*, the *Badejo*, and the two *Aranhas* at the N.E. end of the island. *Isle Xavia*, having a flat summit, and of moderate height, lies off the middle of the island, a little southward of the entrance to the lagoon; and about 7 miles S.W. by S. of it is *Isle Campexe*, where anchorage will be found with southerly winds. The *southern Moleques* are three large white rocks, lying near each other in a N.E. and S.W. direction; when seen from the S.E. they appear steep and conspicuous. Between these rocks and the *Trez Irmaos* westward of them, there is a depth of 15 fathoms. A reef of sunken rocks extends nearly a cable's length southward of the latter islets.

The island is fertile, and produces farina, maize, mandioc, indigo, cochineal, for exportation; and sugar, cotton, coffee, &c., and a variety of fruit, for home consumption. Palm trees may be seen in every direction. The climate is considered the most healthy on the seaboard of Brasil; it has always been remarkably free from epidemics. About four or five hours' ride from the capital are hot springs, the temperature being about 100° F. They are much frequented by people from various parts of Brasil from November to March, and are considered beneficial in rheumatic complaints, disorders of the viscera, &c.

The town of *Nossa Senhora do Destero*, the capital (which is proposed to be transferred to *Lages*, in the interior of the province), is on the West side of the island, about 10 miles southward of Fort Santa Cruz, at the northern entrance. It stands in a bay on the side of a gradually sloping hill, faces the S.W., and has a pleasing appearance from the anchorage. It has a cathedral and eight churches, besides numerous other public buildings, and on the West side of the town is a large hospital. The market-place is on the South side of a large square opposite the cathedral, and is well supplied by the market boats from the neighbouring bays. A tramway is under construction, and it is proposed to provide gas and water-works. It is in direct cable communication with Europe and the Brasilian telegraphic system. The population of the town was 8,890 in 1878.

The island has little or no foreign trade, but is visited occasionally by vessels requiring supplies and repairs. If supplies only are required, and a vessel draws 11 ft. and upward, she is not required to proceed to the town. Most kinds of repairs can be done here. There is good timber of various qualities; but masts and spars of pine can seldom be obtained. The port charges are as follows:—Vessels of 200 tons and under pay 61 milreis; and over 200 and up to 400 tons, 116 milreis; as well as a hospital tax of 640 reis for each of the crew. In 1880 the value of the direct foreign imports, chiefly coal, was £94,861; and of the exports £27,680, principally coffee, hides, &c., but a large trade is carried on with other provinces. In 1880, 39 foreign vessels visited this port, with a total tonnage of 8,291, of which 9, with a tonnage of 2,032, were British.

The anchorage off the town may be approached either round the North or South end of the island as convenient. Pilots can always be had at the small village near Anhatomirim Islet, and mariners visiting the place for the first time will do well to take one. Vessels drawing 11 ft. can reach the port, but if above that draught they must stop at Santa Cruz, where fish, fowls, vegetables, and water may be obtained.

Supplies of all kinds may be obtained at the town of Nossa Senhora do Destero—oxen, pigs, poultry, fish, &c. There are several watering places; the best water is procured from off the village of *San Antonio* on the island, where a vessel may anchor in 18 ft. water; there is also a stream of excellent water in the little bay South of Anhatomirim Islet. Firewood may be obtained by cutting at no great distance from the beach, but unless the trees are young from which it is procured, it will be prudent to immerse it before it is taken on board.

A supply of coal is deposited on *Raton Grande Islet* for the use of ships that cannot proceed to the anchorage off Nossa Senhora do Destero; it can be purchased at a moderate rate, but the means for shipping it are not good.

The winds in the channel of Santa Catharina usually follow its direction either from the northward or southward, but they are seldom strong, and the squalls are not dangerous to vessels with good ground tackle. From March to September, being the winter, the winds in the vicinity of the island generally blow from South to W.S.W., sometimes strong and accompanied with rain, but these do not last more than two or three days.

Towards the month of October the winds draw to the eastward and northward, and the six following months of summer are the hottest in the year. Squalls during this time are frequent from North round by East to West, and when, during this season, the wind is from the south-eastward, it is accompanied by much rain. In general the greatest quantity of rain falls during the months of August and September, but even at this period some years have been exempted.

They have here a proverb, "Pampero a la Missa," as the S.W. winds set in once a week, and often on the Sunday. There is almost always a fresh breeze blowing from one side or the other of the town.

Tides.—It is high water, full and change, at Anhatomirim Islet at about $2^h\ 45^m$; springs rise 6 ft. and neaps 4½ ft. The tides are tolerably regular in Santa Catharina Channel; they enter from the northward and southward at the same time, and meet in the channel off the town, where they separate and return. The mean strength of the tidal current seldom exceeds a third of a mile an hour at half-tide, but at the springs, and a day or two before or after, it sometimes runs 1½ mile. It is, however, somewhat influenced by the wind.

North Channel.—The passage most frequented to the entrance of the North Channel is between Rapa Point, the North extreme of Santa Catharina, and Arvoredo Island N.N.E. of it. It is about 6 miles in breadth, clear of dangers, and either side may be approached to a prudent distance. San José Point, about 3 miles S.W. by W. from that of Rapa, is foul, and should not be approached nearer than a quarter of a mile. A small rocky patch, having 1 fathom on it, also lies off Magalhaes Point.

Light.—On the S.W. summit of Anhatomirim Islet is a low, square, white building, showing a small *fixed red* light, visible for 4 miles to the eastward through an arc of 112°.

Anhatomirim, separated from the main by a narrow passage, lies West of San José Point, and here the channel is from 1¾ to 2¼ miles in breadth, with depths of 4¼ to 6 fathoms; the deepest water is in the middle of the entrance. Anchorage will be found as convenient, and is everywhere safe, either northward or southward of Anhatomirim; but if the vessel's draught admit, a berth will be found in 4½ fathoms water, muddy bottom, at a mile S. ½ E. from the fort, but more shelter will be found rather eastward. Here a vessel will be able to communicate with the village of *San Miguel*, on the main, obtain water from the river of that name in the bay northward of it, and will be in a good position for visiting the town.

The water is always smooth under shelter of the high land. The anchorage is open only to the N.E., but the winds from that quarter are not dangerous. At about 2¾ miles southward of Anhatomirim Islet is that of *Raton Grande*, with a fort on its North end, and half a mile farther South is *Raton Pequeno*. Off Cape *Quebra Cabaço*, on the main, is a rocky flat named *Ipatitinga do Norte*, with 4 ft. on it at low water. *Cape Henriques*, to the southward, is distinguished by being woody, and near it is a sunken rock. The water off the town is shallow, and at the distance of 4 cables from the shore there is only 6 and 7 feet.

During the highest tides there is never more than 12 ft. water over the flats in the channel; the mud, however, is soft for a depth of about 4 ft. No damage will occur from grounding, but considerable delay may take place.

Directions.—During northerly winds the land should be made to the northward, and with southerly winds to the southward of the intended channel. A vessel of about 13 ft. draught can navigate the North channel for the anchorage of Nossa Senhora do Destero; steer in for the entrance between Rapa Point of Sta. Catharina and the Island of Arvoredo, or to the northward of the latter about midway between it and Peñedos San Pedro. Having passed Rapa Point, continue to the S.W. midway between San José Point and Anhatomirim Islet; then alter course to about S.S.W., passing three-quarters of a mile westward of the two Raton Islets, and when the narrow part of the strait, which is about 2 cables in breadth, and commanded on the East by Fort Santa Anna, bears S. by E. ¼ E., steer for it. This will lead nearly half a mile to the eastward of Lagé dos Ilheos Shoal, which is marked by a *red* buoy, and nearly a mile westward of the iron beacon, with cage, on the western rock of a group, at about half a mile N.W. by W. ½ W. from Guarazes Island.

The water deepens to 16 fathoms in the narrows, but shoals again after passing the fort. At nearly 2 cables southward of it is Isle Gato or Ratos, on which is the coal depôt, and to which a berth of more than a cable should be given. Anchor a little southward of the islet, with it bearing about N. ¾ E., the cathedral N.E. by E., and the centre of Isle Vinhas S.E., keeping Raton Pequeno open of Fort Santa Anna, in 3½ to 6 fathoms water.

South Channel.—The southern entrance to the anchorage of Nossa Senhora do Destero is between *Point dos Naufragados*, the south-western extreme of Sta. Catharina Island, and *Fort Islet*, the northernmost of three islets lying S.S.W. of it. The outer islets are the largest, and named *Papagayos*, the southern of which is about 1½ mile from the point. At nearly two-thirds of a mile eastward of Point dos Naufragados is that of the Frayles, and outside it, in the same direction, are the islets Tres Irmaos, the outer one lying about 2½ miles from the latter point.

Naufragados Point Lighthouse is a circular tower, which exhibits, at an elevation of 149 ft. above the sea, a *revolving bright* light, attaining its greatest brilliancy *every minute*, and visible about 18 miles.

Between Papagayos Islets and Point dos Frayles there extends a shoal and breaking bank of 16 ft. depth, 6½ cables long in a N.W. by N. and S.E. by S. direction, and 2½ cables broad. On either side of the bank there is a channel; the N.E. channel is 2¼ cables wide, and has a depth of 24 ft.; the S.W. channel is 3½ cables wide, and has a depth of 29 ft.

A dangerous sunken rock, *Pinheira Rock*, directly in the fairway, having a depth of 9 ft., with regular soundings of 6½ to 7½ fathoms round it, lies South 1¾ mile from Naufragados lighthouse, and N.N.E. 6 cables from the northern extremity of Point Pinheira. The rock is small, and the water breaks on it with East winds. Point Pesqueiro Fundo, open to the eastward of the central and largest Papagayos Islet, leads to the eastward of Pinheira Rock.

Directions.—A vessel entering the *South Channel* should have a pilot, a leading wind, a rising tide, and not draw more than 15 ft. water. From the eastward or southward, bring the centre of the South Papagayos Islet to bear W. by N., and steer with it on that bearing until Naufragados lighthouse bears North, then skirt along the islets at about a quarter of a mile distant, passing at a cable's length from Fort Islet. A vessel may also pass between Tres Irmaos Islets and the main island, and then between the breaking bank and Point dos Frayles, keeping the Sta. Catharina side on board. Between Fort Islet and the lighthouse the water deepens to 11 fathoms, but shoals again rapidly in proceeding to the northward. After passing the lighthouse steer to the northward, on the Santa Catharina side, and pass about a cable westward of *Cardos Islet*, lying rather more than 1⅓ mile about N.W. by N. ¼ N. from the lighthouse. A shoal of 8 ft., mud, extends nearly 2 cables S.E. by S. from the South point of the island.

Having passed Cardos Islet, steer north-westward for the South point of Brito Bay, on the main, and when at the distance of half a mile from the shore, steer to the northward along the western shore, passing *Pesqueiro Fondo Point* at the distance of 4 cables, thus leaving on the western side the village of *Enceado do Brito*, and farther on that of Cedros.

On the eastern side, on the island of St. Catharine at some distance, is seen the village of *Riberao*, or *San Lapa*, and to the northward *Largo Islet*, 2 cables eastward of which is a rock marked by a red buoy. Southward of Largo is a reef of dangerous rocks, called *Cacao Reef*, marked by a *red buoy*, which are avoided by keeping the fort on North Papagayos Islet on with the West point of Isle Cardos, until the steeples of the cathedral appear on the western part of Largo Islet. From off the latter islet steer about N. ¼ W. until an islet, *das Cascas*, bears West; then proceed towards the steeples of the city, and anchor as before directed. The *South Itapitinga* rocks which lie East 3¼ miles from Cascas are marked by a *red buoy*. A sailing vessel attempting to enter this channel with a scant wind and falling tide will probably be set on Fort Islet, or Point dos Naufragados.

The Coast Southward of St. Catharine.—Under the high land of Point Pinheira, which lies 3½ miles South of Naufragados lighthouse, is a good anchorage, sheltered from southerly winds. At 2½ miles from the outer extremity point is an islet, the *Ilha do Coral*, extending North and South, and when seen in this direction it appears of a round form. It is covered with trees, is about three-quarters of a mile in length, and is a useful mark for vessels bound in by the southern passage. Its situation is lat. 27° 55′ 10″, long. 48° 33′ 30″. Between this islet and Cape Sta. Marta Grande, in lat. 28° 37½′, are other islets, which lie off shore as follow:—

Ilha das Araras, to the S.E. of Point Bituba, in lat. 28° 18′ 0″, long. 48° 35′ 30″; Tocoromi Islet, a high and steep rock, about a mile to the S.E. of Ilha das Araras; and the Islet dos Lobos de la Laguna, to the S.W. by S. of the Araras and Tocoromi, in lat. 28° 27′ 30″, long. 48° 44′ 30″.

At Point Bituba, or Imbituba (westward of which a small and snug anchorage in 5 fathoms is stated to exist), begins the beach, within which is a lake and the towns of *Villa Nova*, *Santa Anna*, and *La Laguna*. The last has some trade with Rio Janeiro, and is situate at the South part of the lake, at a mile to the N.W. of the bar, in about lat. 28° 31′ 30″, long. 48° 48′ 30″. At La Laguna is anchorage, practicable only for small vessels drawing under 7 or 8 ft. of water, as there is a bar at the entrance.

A railway is being constructed from Imbituba to Tubarao, with a branch line to the port of Laguna, with a total length of 73 miles. The coal-fields of Tubarao are well known, and will probably now be worked. A line of steamers is also being organised to run between Santa Catharina and these ports.

CAPE SANTA MARTA GRANDE is the final termination of the line of mountains extending within shore to the northward, and is remarkable by having on its summit several great white rocks, which from a distance appear like an assemblage of houses.

Between Cape Santa Marta Grande and the bar of the Rio Grande de Sao Pedro, an extent of about 275 miles, the coast is extremely low, and variegated only by sand-hills and stunted bushes. It can hardly be seen, in clear weather, from the mast-head, at the distance of 7 or 8 miles, and from the deck at not more than 3 miles; the first part, from the North, trends nearly S.W., and is called the Praya, or *Beach of Torres*; it extends to the *Rio Tramandahy*, in about lat. 29° 57′ S. The second part trends southward from Rio Tramandahy, and then S.W. by S. ½ S., and is called the Praya, or *Beach of Pernambuco*, which extends to about lat. 31° 12′ S. The third part trends nearly S.W., and is known under the name of the *Praya do Estreito* or *Destreito*, from lat. 31° 12′ to the mouth of the Rio Grande de San Pedro.

When to the southward of Cape Santa Marta Grande you may see, in running along, a chain of mountains extending westward about 45 miles from the sea into the interior country, and disappearing at the entrance to Tramandahy Lagoon. The beach here may be approached to the distance of 3 or 4 miles. At the town of Torres, 64 miles S.W. of Cape Santa Marta Grande, is a small bay, a suitable place for forming a harbour.

A depth of 27 fathoms, bottom of sand, mud, and shells, was found at 4 miles to the South of Cape Santa Marta Grande, and beyond that, in going to Torres, the water diminished to 4½ fathoms near the shore. We may judge of the decrease of bottom in remarking that from the 27 fathoms to the 4½ fathoms there is a distance of about 65 miles.

The Praya do Pernambuco, as far as lat. 31°, is more steep than that of Torres. There is 35 fathoms of water, bottom of mud and sand, at 4 or 5 miles from the shore. On sailing out in the offing, to the distance of 45 miles, the depths of water increase progressively to 85 fathoms, soft sand. Passing this limit, there was no bottom at 91 fathoms. At 30 miles out the depth is about 74 fathoms.

The Praya do Destreito terminates at the Rio Grande de Sao Pedro, as before mentioned. Depths of 9 to 13 fathoms were found in coasting along it, at 3 or 4 miles. The shore is not higher than that of Pernambuco, but there are some sand-hills more elevated, and there is more vegetation, with villages and towns.

In the offing, at 60 or 70 miles S.E. from this beach, there is 34 and 35 fathoms of water, bottom of mud and sand, and on approaching land the depths gradually diminish.

We may remark, that the Beach of Pernambuco, the central beach of the three, has most water near the shore and in the offing; while, on the contrary, that of Destreito is that which has the least.

RIO GRANDE DO SUL, the most southern province of Brasil, bounded on the North by the Curitiba and the province of Santa Catharina, and South by that of Uruguay, is about 500 miles in length, and may have an average breadth of about 400 miles, containing an area of 118,758 English square miles, with a population, in 1878, of 430,878. It consists chiefly of large plains, covered with herds of cattle, and some mountain ridges traverse it in various directions, but none of them of any great height.

This extent of land, with its alluvial soil, has some lakes of large dimensions, of which the *Lagoa dos Patos*, near the coast, and the largest in Brasil, is about 140 miles in length in a N.E. and S.W. direction, and 40 miles in breadth. This lake receives nearly all the streams which irrigate the northern and eastern portions of the country, and its water continues fresh nearly as far South as the towns of Sao José do Norte and San Pedro do Sul, often called Rio Grande do Sul.

For 10 or 12 miles within Sao José do Norte the lake is shallow, with a depth in the channel of only 8 ft., soft muddy bottom, and marked by stakes. For about 90 miles above this to Point Itapuan there are depths of 3½ or 4 fathoms; thence to *Porto Alegre*, the capital of the province, the channel is again intricate and shallow. Porto Alegre, open to foreign trade, lies at the mouth of the Jacuy River, which runs into the N.W. extremity of the Lagoa, and contained, in 1880, from 30,000 to 35,000 inhabitants, principally Germans; the exports are chiefly hides, tallow, and grain. In 1880, 131 vessels, with a tonnage of 25,925, entered this port from beyond the bar of Rio Grande, about one-tenth of which were British. Frequent voyages are made by steamers plying between Rio Grande, Pelotas, and Porto Alegre. Pilotage is compulsory on foreign vessels, but there is no fixed rate of charges. Vessels anchor here in 2 or 3 fathoms water off the North side of the town. The principal points in the Lagoa dos Patos have lights on them. There are numerous shoals, which may be avoided by the lead.

At about 28 miles to the N.W. of Rio Grande is the town of *Pelotas*, where are the large establishments for killing oxen, from whence the chief exports are derived. It is situated on the left bank of the Rio Gonçalo, 6 miles above its mouth, which enters the Rio Merim. The bar at its mouth is now being dredged, and at present has a depth of 10 ft., to be increased to 11⅔ ft. The town contained a population of about 20,000 in 1879, is lighted with gas, has a good supply of water, and has a tramway to the mouth of the river. In 1880, the value of the exports from Pelotas, all derived from the ox, amounted to about £900,000.

The climate of the province is mild and healthy, the greater part of the soil is fertile, and produces various kinds of grain, and many of the fruits of Europe. The rearing of cattle, horses, and mules, however, is what chiefly distinguishes the country.

The town of Rio Grande (or San Pedro do Sul) is built on the North side of a low peninsula not more than 3 or 4 ft. above the water; it is of some extent, containing, in 1881, about 16,000 inhabitants, principally Portuguese and Germans. Its extremely low situation subjects it to occasional floods. The town is well paved, lighted with gas, and has an abundant supply of pure water. A new custom-house was built in 1878, and a quay along the principal street facing the water, allowing vessels of light draught to lie alongside. *Sao José do Norte* stands about 2¼ miles E.N.E. of it on the eastern side of the river; the ports are quite distinct.*

Vessels with cargoes wholly of salt or coal are allowed to discharge all their cargoes at the anchorage of Sao José; but vessels with general cargoes are required to discharge at Rio Grande, being allowed to unload a portion of their cargo at Sao José to lighten to a sufficient draught, so as to navigate the 10-ft. channel to Rio Grande, the cargo thus discharged being sent to Rio Grande in lighters; and consequently, vessels above 10 ft. draught, when loading, have to complete their cargoes at Sao José. There are now three powerful dredges, for the purpose of clearing the channel. Vessels of about 400 tons are hove down a little above the custom-house. Water is obtained at 9*s.* a ton, but is not very good; it is brought off in casks by shore boats.

The principal articles imported are salt, coal, wine, spirits, flour, oil, and manufactured goods; and the exports consist of different kinds of hides, dry and salted, horns, bones and bone ash, xarque (dried beef), wool, hair, agate, pebbles, &c. The number of vessels which entered this port from foreign countries in 1880 was 340, amounting to 61,526 tons, of which 79, with a tonnage of 14,355, were British. In the same year 89,056 tons of Brasilian shipping entered. The value of the exports in 1880 amounted to nearly £2,000,000. The Brasilian mail steamers make this a port of call.

It has been proposed to construct a railway from Rio Grande to Bagé, a town 150 miles inland, passing through Pelotas, and to touch at Candioto, where there are coal-fields. Another line is being constructed from Porto Alegre to the frontier town of Uruguayana, on the River Uruguay, a distance of about 375 miles. These should increase the importance of this port.

Anchorage.—The port of Rio Grande do Sul may be considered to be comprised in the space from the bar on the South to about half a mile northward of the town of Sao José do Norte on the North, at a distance of 6 miles from the lighthouse; and as far westward as the anchorage of San Pedro do Sul.

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* Shipowners and merchants, when preparing charter parties, &c., for Rio Grande should hold in view the distinction between the two ports; and the term "Rio Grande do Norte" should never be used to designate the town or anchorage of Sao José do Norte, as the former term would apply to that place in the North of Brasil. The custom-house of the latter place is now merged in that of Rio Grande do Sul, a collectoria or establishment for the collection of taxes being left at Sao José.

Within the above space there are four different anchorages; that West of the lighthouse, about 3½ miles inside the bar, is good holding ground in 5 to 7 fathoms water, over sand and mud; here all vessels remain after entering the port, until they have been visited, &c.

The second place is near a large red buoy at the confluence of the channels which run respectively to the town of San Pedro and to that of Sao José. Vessels which have not a fair wind for San Pedro do Sul usually anchor here in from 2½ to 5 fathoms water, the bottom being mostly mud, but the anchors occasionally drag. The anchorage at Sao José is capable of accommodating a large number of vessels in from 5 to 7 fathoms water, on sand and mud, good holding ground, and well sheltered from all winds excepting the S.W. The anchorage of San Pedro do Sul is sheltered from all winds excepting those from the N.E., but vessels occasionally drag their anchors. Vessels are not allowed to anchor between the bar and the extreme point of the coast northward of it, unless on extraordinary occasions: this space is called the Lagomar.

Vessels seldom anchor outside the bar, unless the weather is very fine, and then they anchor in 6 or 7 fathoms, with the lighthouse bearing North or N.N.W., 4 or 5 miles distant. They have some difficulty in weighing the anchor if it has been down long, as it sinks very deep into the sand, which lies under the mud.

The channel from the anchorage inside the bar to that of Sao José do Norte is regular, bounded on either side by low sandy land, and has not changed materially since the survey of 1849.

The channel leading to San Pedro do Sul is very narrow, and marked by stakes, the entrance being marked by a buoy. To the northward of the town are two low swampy islets, rising from an extensive flat; the latter extends to the south-eastward into the main channel round the flat from the peninsula, and forms the eastern and northern boundary of the channel to San Pedro do Sul, the western boundary being the shallow sandy flat, extending about three-quarters of a mile eastward of the peninsula.

The bar, which lies about 3½ miles South from the lighthouse, is indicated by the breakers on either side, and has seldom more than 12 ft. water over it, and often less than 9 ft.; a large number of vessels in crossing touch the ground, but without receiving further damage. The bar at present is barely a cable across; the deep-water channel is marked by buoys, the position and colour of which are subject to constant change. Temporary staffs are erected on the beach to lead vessels in the deepest water.

Several vessels have been wrecked on or in the immediate vicinity of the bar. The greatest caution on the part of shipmasters is necessary to avoid such casualties, and too much attention cannot be paid to the signals, which are kept continually hoisted at the entrance when the bar is practicable. Vessels for Rio Grande ought *never to load over a draught of* 11 *feet.*—*Mr. Consul Gollan*, 1881.

The banks composing the bar are of quicksand, which, however, becomes hardened on its surface after remaining for a certain length of time in one position. Vessels striking on this often rebound as if striking on a rocky bottom; should they, however, break through the hard surface, in all probability the vessel will be gradually swallowed up in the sand, if heavily laden, as was the *Helianthus*, laden with coal, in 1854.

Immediately on striking, anchors should be laid out in such a direction in which the vessel is most likely to float off, taking into consideration the wind and current; and having hove taut the cables, the vessel should then be lightened, and the assistance of a pilot and steam-tug be obtained; every moment's delay will be of the utmost importance. No opportunity should be lost in crossing the bar, and vessels should not draw more than 11 ft. water; with that draught they are often detained more than a fortnight.

The highest water is caused by the pamperos or S.W. winds, when vessels may cross the bar at its commencement, if prepared to take advantage of it; but if the wind should be strong it soon causes a heavy sea on the bar, when they cannot enter; and should it veer to the S.E. (which it sometimes does), and blow hard, the water on the coast being shallow the sea rises quickly, and it becomes dangerous for deeply-laden vessels, consequently many are lost in the neighbourhood of the port. It is advisable for vessels of 10 ft. draught to have a steam-tug, unless there is a fair wind with a good breeze. In leaving the port vessels should not draw more than 10½ ft.; with that draught they are often detained more than a fortnight.

Light.—At the North point of entrance to Rio Grande do Sul, about a mile within the extremity of the point, is an iron circular tower, about 100 ft. high, painted a reddish umber, which exhibits at 96 ft. above the sea a *revolving bright* light, attaining its greatest brilliancy *every two minutes*, visible 14 miles off. It stands on the sand, about 3 ft. above the sea, 92 yards N.N.W. of the old lighthouse, now the watch-tower, which is square, whitewashed, and has a large and small flagstaff on it; the former has a yard across. The staffs southward of the lighthouse are temporary ones, erected by the pilots to lead them through the deepest water on the bar.

SIGNALS.*—When within signal distance of the watch-tower, the vessel should hoist the signal of her draught of water, and for this purpose she should be prepared with a red flag, a white flag, a blue flag, and a blue burgee or pendant. The signal should be hoisted so as to be clearly seen from the watch-tower, and, in order to prevent mistakes, no other signals, if possible, should be made at the same time.

The signal to approach the bar is a red flag, hoisted at the large flagstaff of the watch-tower, and will be always hoisted when the bar is practicable; but it must be understood that those vessels alone are to comply with it whose draught of water may be equal to or less than that indicated at the same time by the signal exhibited from the small flagstaff of the watch tower.

When the signals are hauled down from the watch-tower or pilot boat stationed at the bar, vessels cannot enter, and they should immediately stand off. From want of attention to the signals, the red flag is often hauled down, in consequence of one or more vessels running into danger; thus obliging all to haul off, some losing their chance of getting in through the neglect of others.

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* "A better system of signalling is required at the bar and in the port. By our official log-books it would seem that the Brasilian Government have adopted the International Code, but it is not so at this port; they will pay no heed to it or any other, except their so called red, white, and blue flags, from which every semblance of colour has faded away,—the result being to keep vessels beating outside for days together, and putting them in extreme peril."—C. REEVES, Master, *Louisa* (1873).

The following signals are hoisted at the small flagstaff of the watch-tower, and at the pilot boat at the bar, to indicate the depth of water: and also on board the vessels entering or leaving the port, to indicate their draught of water.

SIGNALS.	SIGNIFICATIONS.
A white flag	7 feet 3 inches on the bar, or vessels' draught.
A blue flag	7 „ 8 „ „
A red flag	8 „ 0 „ „
A white flag over a blue one	8 „ 4 „ „
A blue flag over a white one	8 „ 9 „ „
A white flag over a red one	9 „ 2 „ „
A red flag over a white one	9 „ 6 „ „
A blue flag over a red one	9 „ 10 „ „
A red flag over a blue one	10 „ 2 „ „
A blue burgee over a white flag	10 „ 7 „ „
A white flag over a blue burgee	10 „ 11 „ „
A blue burgee over a blue flag	11 „ 3 „ „
A blue flag over a blue burgee	11 „ 8 „ „
A blue burgee over a red flag	12 „ 0 „ „
A red flag over a blue burgee	12 „ 4 „ „
A blue burgee over white flag, with a blue flag under	12 „ 9 „ „
A blue flag over a white flag, with a blue burgee under	13 „ 2 „ „
A blue burgee over a white flag, with a red flag under	13 „ 6 „ „
A red flag over a white flag, with a blue burgee under	13 „ 10 „ „
A blue burgee over a blue flag, with a red flag under	14 „ 2 „ „
A red flag over a blue flag, with a blue burgee under	14 „ 7 „ „

When, for want of a favourable wind, vessels inward or outward bound can only proceed by towage, a white flag with red swallow-tails will be hoisted above the signal indicating the number of feet on the bar; which will be repeated by the pilot vessel stationed there.

The signal for a steam-tug is the national flag hoisted at the fore over the flags for the draught of water.

If a vessel require assistance, the flag of its nation should be hoisted half-mast high. If provisions are required, her distinguishing flag should be hoisted under the national flag. If an anchor and cable is required, the distinguishing flag should be hoisted at the peak.

For vessels at the bar anchorage about to leave the port, the depth of water will be shown by signal from the flagstaff close to the pilotage wharf; and whenever this depth is that required for a vessel ready to sail, the signal of her draught should be hoisted and retained whilst there is any probability of her being able to proceed to sea; having been visited by the bar-master, they are at liberty to proceed. They should be ready to sail on the shortest notice, as a delay of a quarter of an hour, together with the time required to be at the bar, may for weeks deprive a vessel of the chance of getting out. The pilots do not always go on board, but keep ahead in their boats and direct the course of the vessel by waving the flag. The red flag on the tower only refers to vessels outside the bar.

There is a telegraph by flags between the village at the bar and the town of San Pedro do Sul, by which a communication may be made by vessels at the anchorage West of the lighthouse or those coming in, through the pilot, with the consul or a vessel's consignee. The signals are exhibited from staffs; one near the wharf, in front of the lighthouse, called the pilotage wharf; the second on the West side of the river; and the third on the theatre at San Pedro do Sul.

The following signals are made from the yard of the large mast of the watch-tower, to vessels outside the bar, by blue pendants and blue balls: which are answered by dipping twice the national flag.

SIGNALS.	SIGNIFICATION.
A ball at left yard-arm.	Vessel is too close to the bar.
A pendant.	Work to windward, as you are to leeward of the bar.
Two balls.	Vessel is too far to windward.
Two pendants.	Stand out to sea, as you are too near the coast.
A ball over a pendant.	Stand out to sea, as you are too near the shoals.
A pendant over a ball.	Stand out to sea, as the wind threatens from south-eastward.
A ball over two pendants.	If you keep on this tack you will run aground.
A ball between two pendants.	Anchor northward of the bar, at a sufficient distance from the shore.
A ball at each yard-arm.	Anchor southward of the bar in 6 to 8 fathoms.
A ball at left yard-arm, and a pendant at right yard-arm.	Carry more sail, so as to be enabled to enter.
A ball at left yard-arm, and two pendants at the right yard-arm.	The signal to close is for those vessels only whose draught of water is indicated from the watch-tower.
A ball at left yard-arm, and a ball over a pendant at right yard-arm.	It is not possible to enter now, the state of the bar does not permit it.
A ball at left yard-arm, and a pendant over a ball at right yard-arm.	You can only enter at present by towage.
A ball at left yard-arm, and a ball over two pendants at right yard-arm.	You cannot enter at present, as the wind is light, and there is a strong current.
A ball at left yard-arm, and a ball between two pendants at right yard-arm.	The assistance you request is being prepared.
A pendant at left yard-arm, and a pendant at right yard-arm.	Approach the bar, as the pilot boat is there, or the steamer is about to come out.
Two balls at left yard-arm, and a pendant at right yard-arm.	Navigate so as to approach the boat which is to go out with the succour you have requested.
A pendant at left yard-arm, and a ball over a pendant at right yard-arm.	The vessel which requires a pilot is to navigate towards the boat coming out.
A pendant at left yard-arm, and a pendant over a ball at right yard-arm.	Observe attentively the signal of the watch-tower, as the pilot-boat cannot go to the bar.
Two balls at left yard-arm, and two pendants at right yard-arm.	As soon as darkness comes on, be guided by the lights of the pilot-boats which are at the bar.
A ball over a pendant at left yard-arm, and a ball over a pendant at right yard-arm.	There is not at present a tug-steamer at the bar.
A pendant over a ball at left yard-arm, and a pendant over a ball at right yard-arm.	The tug-steamer cannot go out at present.
A ball over a pendant at left yard-arm, and a pendant over a ball at right yard-arm.	Deliver to the steamer, or pilot-boat, the mails, correspondence, or notices which you bring.

PILOTS.—Government pilots are supposed to take all vessels across the bar and up to the first anchorage, the charge from thence to San Pedro do Sul being 16 dollars for all foreign vessels. The bar should never be crossed without a pilot on board, unless the bar-boat is at her station on the bar. When the bar-boat is unable to remain out, and the bar is still practicable, pilots come out in steam-tugs. The signal for a pilot is the vessel's national flag under the signal of her draught of water at the fore; the pilots do not always go on board, but direct the vessel by the waving of a flag.*

The Tides in the harbour sometimes run strong, but irregular as to time, their direction and velocity appear to be entirely governed by the wind; the highest water occurs immediately before and during the continuance of south-westerly winds, which blow occasionally, generally lasting two or three days. A current of about 3 miles an hour runs out of the river during the ebb, and carries the discoloured water some distance beyond the bar. The greatest ordinary rise is 1½ to 2 feet.

The Current along the coast between St. Catherine and Rio Grande do Sul has a tendency to set from North to South, and during the N.E. winds it sometimes runs at the rate of 40 miles a day. During S.E. winds the sea is always heavy, and then the current sets toward the shore, and several wrecks are believed to have taken place in consequence.

Winds.—The prevailing winds on the coast of Rio Grande do Sul are the N.E. varying from the N.N.E. to E.N.E., and the S.W. varying from S.S.W. to W.S.W.; the former blowing chiefly from November to May, and the latter in June, July, and August. The N.E. winds usually continue three to five days, though sometimes they last with little intermission much longer; they generally commence weakly and gradually increase in force; they are often rainy, and succeeded by a calm, and an atmosphere much charged with electricity; when they blow with much force it is a sign of a S.W. wind.

The S.W. winds on the contrary are at the first most violent, commencing usually by a sudden gust; they may last very steadily for two or three days, and have much more force comparatively than the N.E. winds, and usually clear the atmosphere. The East wind occasionally succeeds the N.E., and the South and S.E. follow the S.W. The West and W.N.W. winds are rare, but usually usher in unfavourable weather. The S.E. winds blow with much force and cause a heavy sea.

Several hours before the S.W. wind is felt, the water on the bar of Rio Grande do Sul will rise from the accumulation of the sea between the banks at the bar and the coast to the southward, and a ground swell from the southward will be experienced.

The S.W. storms, called *Pamperos* by the Buenos Ayreans, and *Rebojos* by the Brasilians, blow furiously here in winter, about the full and change. They usually come on in a sudden gust, though the appearance of the sky gives sufficient warning for some time first, and blow very hard indeed for five or six hours, when the wind decreases, and a few days of very fine weather succeed. Sometimes they draw round to the South and S.E. before the wind abates, which renders it highly dangerous for a vessel near the coast. As the water is shoal there is a deep ground swell, which sets a ship very fast in-shore.

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* The charge for towing in over the bar is 800 reis per ton (Brasilian); but if taken in tow more than 2 miles from the bar, which is optional, 1,200 reis per ton. For towing out, 640 reis per ton; but if the vessel was not towed in, 800 reis per ton. A vessel is not charged for more than 250 tons. The Brasilian measurement is from 35 to 40 per cent. more than British. The value of the milreis, 1,000 reis, is 2*s*. 3*d*.

Directions.—During north-easterly winds a vessel should approach the bar of Rio Grande do Sul from that quarter, make due allowance for a strong southerly set, and go no farther South than lat. 32° S. until her position is ascertained.[*] As the soundings extend some distance from the coast, the usual precautions should be taken with the lead; and, in running to the southward, close the coast a little northward of the lighthouse; the church of San Pedro do Sul will be the first object that will be seen, then the lighthouse, which, with the adjacent watch-tower, appear like two sails, and then the vessels at anchor inside the bar.

Do not haul too close in-shore, but keep in more than 6½ fathoms, in order to clear the banks forming the bar, until the lighthouse bears about N.N.W., the outer edge of the S.E. bank being steep-to; but no vessel can cross the bar under sail unless the wind is well to the eastward, so as to enable her to steer clean full about N.N.E. When the wind is from south-westward the lighthouse should be made from the southward; and in coming from that quarter, keep in not less than 6 or 7 fathoms water.

Unless the weather is unusually fine, the sea breaks now and then in 11 ft. on the bar; and as the bar frequently changes its position, no vessel should attempt to cross it without a pilot; but in case of necessity, or in vessels of light draught, the following directions should be attended to. Having sighted the lighthouse, hoist the signal of the vessel's draught of water, so as to be clearly seen; when, on being repeated from the small staff on the watch-tower, and the signal made to close, the red flag hoisted at the tall staff, steer towards the lighthouse for the opening between the breakers, still attending to the signals.

On approaching the pilot or bar boat, which is usually anchored on the bar close to the deepest water, steer directly toward her, observing her signal of the depth of water on the bar, which will be repeated by the watch-tower. Should the signal shown indicate a depth of water equal or more than the vessel's draught, she may confidently proceed on; but, if the signal of the depth of water exhibited from the pilot boat or watch-tower, or the red flag at the large staff on the latter, be hauled down, the vessel should immediately stand seaward, off and on, or anchor for a more favourable opportunity.

On approaching the pilot boat a red flag will be waved from her in the direction the vessel is to steer; when held upright, steer directly towards her. There is occasionally another pilot boat stationed in the inlet between the bar and the anchorage West of the lighthouse, which also directs the course of the vessel with a movable red flag. If the second boat should be in her station, the vessel will be guided by its signals, immediately after passing the first pilot boat; but, if it should not be there, she may act according to the signals of the first pilot boat.

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[*] The brig *Sweet Home*, Captain Reid, and a Brasilian schooner, were reported to have struck on a shoal off this coast, in lat. 31° 3′ S., long. 49° 47′ W., in 1843. H.M.S. *Gleaner*, in 1865, could find no shoal water here. In 1866, the commander of the Brasilian war steamer *Princeza de Joinville*, reported that he *saw* what was *thought* to be a rock, 4 or 5 ft. above water at its highest part, and 1½ to 2 cables in extent, in lat. 32° 51½′ S., long. 51′ 31′ W. H.M.S. *Volage*, in December, 1876, and in fine weather, carefully sought for both these reported dangers, but could find no trace of them in or around the given positions.

If neither of the pilot boats are in their stations, and the red flag from the watch-tower, the signal to approach, continues to fly, the vessel should act wholly on the signals from the watch-tower, where on extraordinary occasions a red flag may be shown to guide vessels, as shown from the pilot boats. When over the bar, steer to the northward between the buoys marking the channel. When well inside the bar the water deepens rapidly, the channel widens, and the bank on either side shows distinctly; the course of the channel is about N.W. by N., trending to the northward as the vessel advances to the anchorage West of the lighthouse.

In proceeding up the channel, keep along the western shore where it is steep-to, particularly abreast the sand-hills; when abreast Mangueira Point, steer towards the sand-hills, with a remarkable tall house amongst the trees a little on the starboard bow, and keep along the eastern shore, keeping the buoy on the flats extending from the westward, on the port side, and anchor where convenient off San José.

The channel to San Pedro do Sul is narrow, circuitous, and carries from 9 to 20 ft.; the former depth is in the bend of the channel; caution is required in taking it, for, if a vessel grounds when the water is high, considerable delay and expense may ensue. A vessel should have a fair wind or a steam-tug. The Brasilian vessels are moored to the westward of the custom-house wharf, and foreign vessels to the eastward, and secured head and stern.

The Coast of Albardao, which may be presumed to extend from the bar of Rio Grande to the embouchure of the River Chuy, which is the boundary between Brasil and Uruguay, consists of a narrow strip of land forming a boundary between the sea and Lake Mirim with some smaller inland lakes. It is flat all along, and from the bar of Rio Grande to Cape Castillos the water is shallow, having midway at about 17 miles from the shore only 10 fathoms, and in the latitude of the entrance to the Chuy at 34 miles from the shore the same depth will be found. Several vessels of 10 ft. draught have navigated close along this shore. Vessels of large draught should not, however, approach it too close, as Captain Mouchez says that the depth is very irregular, with patches of less than 5 fathoms.

The first remarkable object southward of the entrance to the River Chuy is

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[*] Caution.—The coast of Albardao, which comprises more than 120 miles, is frequented by ill-disposed men, in the greater part wanderers, and intimately connected with the natives of the Oriental State who inhabit the neighbourhood of the Chuy as far as Castillos, and are known by the name of "Montoneros." These men commonly flock to the shores of the sea whenever they nourish hopes of plunder, and thus is explained the general cognizance of the fact without the possibility of coming to the knowledge of who are its authors. This simple description of the place is sufficient to show the great difficulties attending the discovery of the depredators of goods saved.—*Report of the Chief of Police*, May 10th, 1862.

The few inhabitants strewed over this vast desert, in order not to be discovered and punished, used to convey into the interior everything which they could pilfer.—*Official Report*, July 3rd, 1861.

a rocky point, with a few isolated and partly submerged rocks off it, named *Chicos*, or *Castillos Pequenos*, or the Small Castles. On the coast, about 3 miles northward of the Castillos Pequenos, stands a fort; another, *Fuerto de Sta. Tereza*, lying the same distance to the southward. Castillos Pequenos forms the northern extremity of Castillos Bay, the flat sandy shore of which curves to the southward and S.W., and at the distance of about 27 miles is Cape Castillos. At about 8 miles northward of the cape are two hills (*Los dos Hermanos*) in an East and West direction.

SECTION VI.

THE RIO DE LA PLATA AND EAST COAST OF PATAGONIA.

I.—THE RIO DE LA PLATA.

The **RIO DE LA PLATA** is one of the largest rivers in South America, after the Amazon. It was discovered by Juan Diaz de Solis, in 1508, who re-visited it in 1515, and navigated it as far as a small island, in lat. 34° 23′ S., and having seen some cabins on shore, he had the boldness to disembark with ten men, when they were all put to death by the aborigines. Five years afterwards Sebastian Cabot, who, from neglect, passed from the service of the English to that of the Spaniards, was sent to discover the Strait of Magalhaen; but, finding himself impeded in his views by the disobedience of his crews, was under the necessity of entering the River Plata, which he navigated as far as the island discovered by Solis, and to which he gave the name of San Gabriel. He pursued his voyage as far as the rivers Paraña and Paraguay, had a battle with the Indians, in which he lost twenty-five men, but succeeded in routing them, taking from them treasures of silver, which they had brought from Peru; and, supposing that there was abundance of this metal in the territories washed by the river, called it Rio de la Plata (river of silver); whereby it lost the name of Solis, first given it by the discoverer.*

The Rio Plata is at its mouth about 120 miles wide from Cape St. Antonio on the South to Maldonado on the North. From thence to the junction of the Uruguay, it preserves its name, being afterwards called the Paraña. Although the whole of it is navigable, it has many shoals and rocks. Between Point Piedras on the South, and Point Yeguas on the North, it is 52 miles wide. The coloured water which it brings down is often visible in the Atlantic about 100 miles from its embouchure. The estuary of the Plata is generally shallow, and the navigation extends along the southern shores. The tides are perceptible as far as Buenos Ayres.

The water continues fresh as far down as the River Santa Lucia, 12 miles above Monte Video, on the North, and Piedras Point on the South, when it becomes brackish. It is long in mingling with that of the sea, which loses its blue tint at a distance of 75 miles from the mouth of the river. Vessels of large draught may navigate as far as Monte Video, and those of 17 ft. draught to Buenos Ayres and the islets of Hornos, N.W. of Colonia. Small vessels enter the inner road of Buenos Ayres to within about half a mile of the town.

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* Much valuable information concerning the countries around the Rio de la Plata will be found in the "Handbook of the River Plate Republics," by Messrs. M. G. and E. T. Mulhall. (E. Stanford.)

In approaching on the parallel of 33° 45′ S., when at 10 miles off shore, there may be seen in the West the *Sierra del Carbonero*, a range of hills 4½ miles long in a N.E. and S.W. direction, the centre being the highest; it lies inland 9½ miles from the shore, and is on the frontier line between Brasil and the Banda Oriental or Uruguay. On one of the slopes of the hills the fort of San Miguel is very conspicuous.

After running 25 miles parallel to the coast the *Cerro de los Difuntos* will be seen; it is composed of several summits of about the same height, and is situated 6 miles from the shore on the West side of a lagoon. When seen in the N.W., this cerro presents a gap or ravine, having a great resemblance to Cuchillo del Roldan, or Roland's Gap, in the Pyrenees, which is a marked feature.

As you advance to the S.W. at the same distance from the coast, the naked conical hill of the *Cerro* or *Agudo de Navarro*, rising from the centre of a group of smaller hills, will show itself. It lies 5 miles W. by S. ½ S. from the Cerro de los Difuntos, and at 9 miles from the shore. Roland's Gap is well seen from this position bearing N.W.

At 19 miles westward of Cape Castillo is the high mountain range *Cerro Chafalote*, standing in the midst of a plain, and when seen from the eastward shows three summits, the centre being the highest.

CAPE CASTILLO is the most northerly point that a ship should sight, if from the state of the weather, or the position of the vessel, it should be thought prudent to make the land before running up to Lobos Islet. This cape is easily distinguished by the white rounded sand-hill at its back, the black islets which lie off it, and by the lighthouse on Cape Polonio; and, in case of need, fair shelter may be found to the S.W. in Castillo Bay, as hereafter described, if it comes on to blow hard from the S.W. after having made the land, and a vessel does not wish to keep the sea.

At the end of the white sandy downs, which form the southern limit of the coast of Brasil, is a rocky point which trends slightly to the North, after which the shore stretches for a mile to the S.E., and forms another rocky point; the former is Cape Castillo, the latter Point *Coronilla*. *Pilots* cruize between Cape Castillo and Maldonado Bay.*

The *Cerro de Buena Vista* rises to a height of 184 ft. above the sea, midway between the above two points, close to the shore; it is a round sand-hill, with a summit towards the N.W., ending in a sandy peak. There are patches of black bushes on its white sides, and its isolation and peculiar form render it a good mark for this part of the coast. It may be seen in clear weather at about 15 miles off, and the vessel will then be in from 15 to 20 fathoms water.

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* A notice, issued by the Government of Uruguay, earnestly advises all vessels to take pilots, on account of the numerous wrecks that occur between the entrance of the Rio de la Plata and Monte Video; these losses are said to be due more to irregular currents than the winds.

Castillo Grande, or *Marcos Islet*, at about 1½ mile to the eastward, derives its name from a steep black rock like a castle, which stands up on its S.E. side, 102 ft. above the sea. The islet is nearly circular, about 320 yards in diameter, and appears as a sail when first seen. *Castillo Chico*, or *Isla de Tierra*, is a smaller islet, lying three-quarters of a mile to the westward of the former; it is not so steep, and is separated from the coast by a passage 160 yards wide and 20 ft. deep. The islet is about 40 ft. high, and its top covered with bushes. In fine weather a boat can land on the S.W. side, where is a small creek. In the channel between the two Castillo Islets there is a depth of from 8 to 9 fathoms, sand and mud; vessels of any size may pass through without difficulty.

Castillo Bay.—From Cape Castillo, the coast to the N.W. forms a small sandy bay, where boats may land. The shore continues low to the northward for a distance of 1½ mile, where the Castillo lagoon has its outlet. In Castillo Bay, vessels of any size may find shelter from all winds from S.E., round by the South, to N.W. The best anchorage is with the summit of Buena Vista bearing about S.W. by S. ½ S., at 3 or 4 cables from the point, in a depth of 4 fathoms, hard sand. Before dropping the anchor it is necessary to be sure of the nature of the bottom, as patches of rock are scattered about.

There is tolerably good anchorage also, in 3 fathoms water, fine sand, in the centre of the bay formed by Cape Castillo to the West, and the islet Castillo Chico to the S.E.; here a vessel would lie at 2 cables from the nearest land, and in case of its coming on to blow from the N.E., could get out between the islet and Coronilla Point.

These anchorages, which were formerly much frequented, are now completely forgotten. It is useful, however, to recall their existence to the mariner. Many a vessel disabled by a pampero at the embouchure of the La Plata has been obliged to bear up for Santa Catharina, or Rio Janeiro, to repair damages; others have been driven off a long way to sea, whereas, had they known of these anchorages close at hand, they might have run for them. Vessels, however, should be on the watch for the wind shifting to the N.E., when they should put to sea immediately, as that wind raises a heavy sea on this coast.

In the angle of the bay, at the very foot of the Cerro, there is a small stream where boats can get fresh water easily. There is no fuel but the brushwood on the hill. From the top of the Cerro are seen, towards the interior, cultivated and inhabited plains, but the coast is a desert.

Cape Polonio, a rocky promontory, with a green hill above it, lies 2¾ miles to the southward of Coronilla Point, the intervening coast being sandy downs, from 12 to 18 ft. high. In the bay between Capes Castillo and Polonio there is anchorage with off-shore winds.

The Lighthouse on Cape Polonio is built of gray masonry, with three broad, equi-distant white bands, and stands on a circular platform near the beach. The light is *fixed bright*, elevated 137 ft., and visible about 20 miles.

Islas de Torres are a group of three islets, which extend 2 miles to the eastward of Cape Polonio; they are arid rocks, from 100 to 160 yards in diameter, and from 12 to 18 ft. high. They are surrounded by reefs, and strangers should not attempt to pass through between them. A *dangerous reef*, which does not always break, lies 1 cable to the N.E. of the outermost. Torres Rocks, as well as the Castillos, are much frequented by seals; and the only inhabitants seen along the coast hereabouts are the watchers who protect the seals, farmed by the government of Monte Video.

Polonio Rock, a dangerous rocky shoal, with 11 ft. least water over it, which does not always break, lies 2½ miles S.W. by S. from the cape, and takes its name from a Spanish vessel that was lost on it in the year 1735. Between the shore and the reef there is a passage 2 miles wide, with 10 and 11 fathoms, sand and mud, but the mariner is cautioned to make well sure of his bearings before he trusts his vessel in the vicinity of this dangerous shoal. Castillo Grande kept open of the Islas de Torres clears it.

Polonio Bay, to the S.W. of the cape, offers fair anchorage with off-shore winds, and as far out as N.E. A vessel may, if detained in this neighbourhood, change her anchorage to the northward or southward of the cape, according to the wind. There is, however, at times, a heavy swell in these small bays.

Punta Rubia, or *Red Point*.—The coast from Cape Polonio extends in a low range of sandy downs, S.W. for 20 miles, to a red cliff, about 50 ft. high, named Rubia, which is remarkable as the only cliff of that colour in the whole extent of the embouchure of the La Plata, whence it takes its name. The isolation of this point, surrounded by sandy downs, its height, and colour, have often caused it, from a distance, to be taken for an island near the coast, whence it was named *Isla Falsa*. The natives likewise know it by the name of *Punta del Rodeo*, on account of an estancia or farm that may be seen 2 miles in the interior.

With the exception of the Polonio Reef, the coast is all along clear of danger; and at 2 miles from the shore there is 12 or 13 fathoms water; but, on nearing Cape Santa Maria, it shoals to 10 and 8 fathoms.

CAPE SANTA MARIA, improperly named a cape, as it is only a low point, lies 4 miles southward of Punta Rubia, the coast between forming the anchorage of *Arecife*, presently described, well sheltered against West and S.W. winds. Cape Santa Maria is called by the natives *Punta de Rocha*, on account of the town and lagoon of that name a few miles inland to the N.W. A reef of rocks extends a cable's length to the southward of the cape. At about 35 miles E.S.E. of the cape is a 10-fathoms bank on the parallel of 35° S.

The LIGHTHOUSE on Cape Santa Maria is a round masonry tower, 125 ft. high, showing a *revolving bright* light, attaining its greatest brilliancy once every minute, elevated 132 ft., and visible 18 miles.

There is anchorage West of the cape, with off-shore winds, in 6 or 7 fathoms water, about three-quarters of a mile from the beach.

In 1865 the steamship *Herschel* struck on a rock off Cape Santa Maria. In May, 1871, H.M.S. *Speedwell*, in searching for the rock, which was believed to be small, found a depth of 6½ fathoms at 2 miles E. by N. ½ N. from Cape Santa Maria. Until the position of the danger is correctly ascertained, vessels should give the cape a good berth.

Bank.—Mr. Slack, master of the *La Place*, in 1872, reported a dangerous sand-bank off Cape Santa Maria. The bank lies parallel to the shore about 2 miles distant; its S.W. end, which is perfectly distinct, bearing about South from the flagstaff at Port Paloma. There appeared to be a deep channel inside the sand-bank.

Arecife Anchorage is in the small bay to the North of Paloma Isle. At 1¼ mile N.E. by N. from the islet there is a rocky head, having only 15 ft. water over it, which breaks when there is any swell, and must be avoided by a vessel going into the bay to seek shelter, which she may do in winds from S.S.E., round by South, to N.W.: the anchorage is in 3½ fathoms, sand and gravel, at half a mile from the islet, and at rather less from the shore. The bearings for the 15-ft. rock are the centre of Paloma S.S.W., the white sandy down near the sea on with the gap in the hill W. by S., and Rubia Point N. ¾ E. The distance of the rock from the shore is 1 mile.

Santa Maria, or Paloma Harbour.—A short distance to the northward of Cape Sta. Maria are two small islands, which together form the small harbour of Paloma. The northern islet is the larger, and is named *Paloma*. A reef extends off it 4 cables to the N.E. The other islet, *Tuna*, or *Espinosa*, is low, sandy, and covered with brushwood. It is a circular basin, about 4 cables in diameter, having a general depth of 8 or 9 ft., hard sand, and well adapted for a few small coasters. It was surveyed by Capt. Mouchez. The entrance, which is between the two islets, is narrowed by the reefs which extend from either islet towards the centre, and form a channel about 50 yards broad. Nearly in the centre of the channel there is a rock, having a depth of 7 ft.; the deepest water is on the Paloma side. By keeping as close as possible to the edge of the surf on that side will lead in about 11 ft. water, and clear of the rock, which it will be prudent to buoy before the vessel enters. The channel on the other side of the rock has a depth of only 8 or 9 ft., uneven bottom. Just inside the entrance there is the deepest water, about 15 ft.; moor N.E. and S.W., as the space is very confined.

H.M.S. *Pert*, drawing 9 ft., entered Paloma Harbour in November, 1872, and rode out a heavy pampero there. The marks on the rocks indicated a rise and fall of about 3 ft., but the tides are much influenced by the winds. There is a small stream of fresh water at the northern end of the harbour: abundance of geese, ducks, swans, and partridges, may be shot near Rocha Lagoon, about 5 miles inland.

In approaching this part of the coast from the offing, the mariner must be on his guard not to make a mistake between Cape Santa Maria and Cape Castillo, both marked by lighthouses, which has been frequently done. If the weather be fine, the difference of 17 miles in latitude should be a sufficient guide; but, if cloudy, he should remember that cape, or rather Point Santa Maria, is low, and backed by sandy downs of moderate height, indented by three gaps as seen from the N.E., the north-easternmost gap being twice as large as either of the others.

Cape Castillo, on the contrary, may be recognised at a distance by the round white sand-hill of Buena Vista (184 ft.); and, rising up in advance of it, the steep black islet Castillo Grande (105 ft.), with the detached green hill, (120 feet) of Cape Polonio about 3 miles to the southward. As seen from the N.E., the coast about Cape Castillos presents the aspect of separate conical hills, while near Cape Santa Maria the appearance is of undulating sand-hills, varying from 50 to 80 ft. in height. In heavy weather, if the land cannot be made out, come no nearer than 15 fathoms water, as there is 12 fathoms close to Polonio Rock.

The Coast from Cape Santa Maria extends W. ½ S., a uniform sandy beach, for 5 miles to the Laguna de Rocha, and then S.W. by W. for 21 miles to San José Ignacio or Piedras Point, and is clear of dangers.

Punta Piedras, or *San José Ignacio Point*, so named from the lagoon in the vicinity, is remarkable from a hill which rises above it, and on which may be seen, from a distance, a large white triangular patch of sand, bordered by verdure. The point is formed by a frontage of rocks two-thirds of a mile in extent East and West, divided by a small sandy beach. At 1 mile South of the cape there is a plateau of rocks, on which is a depth of 5½ to 8 fathoms. From the cape the coast trends to S.W. by W. ½ W. for 16 miles to Punta del Este, and is safe.

Lighthouse.—On San José Ignacio Point is a lighthouse, showing a *fixed bright* light, elevated 103 ft., and visible 15 miles. It is intended to change the colour of the light to *red*.

PUNTA del ESTE, or East Point, which should be considered the real North point of entrance of the La Plata, forms the eastern part of Maldonado Bay. It is a small blackish headland at the end of some sandy downs, and rises about 50 ft. above the level of the sea, with a lighthouse on its summit. Some rocks extend more than a mile to the W.S.W. In coming from the offing, if the weather is fine, the summits of the mountains Pan de Azucar (1,374 ft.), and the Sierra de las Animas (1,765 ft.), may be seen in the N.W. 8 or 10 miles before seeing Punta del Este.

LIGHT.—On the highest part of Punta del Este (East Point), at a quarter of a mile from its extremity, is a tower 90 ft. high, which exhibits, at 152 ft. above the sea, a *fixed bright* light, visible 20 miles.[*] On the bearing of N.W. by W., distant 13 miles, it is obscured by Lobos Isle.

A doubtful rock, reported to lie S.W. ¼ W. 6 miles from East Point lighthouse, but according to the local pilots S.W. 3 miles from the lighthouse, was unsuccessfully searched for by H.M.S. *Mallard*, in 1878, during a period of eighteen days, when the least depth obtained was 9 fathoms. The rock has accordingly been expunged from the chart. Another rock, of 19 ft., was reported to lie 1½ mile S.W. ¾ S. from the lighthouse, but this danger was not found by the *Mallard*.

LOBOS ISLE, 4½ miles S.E. ¾ E. of East Point, is flat, rugged, 65 ft. high, and may be seen from a distance of 12 to 15 miles. It is usually visible a little sooner than East Point; its coast is rocky, and can only be approached by a sandy creek on the North side of the isle, near the place where are the huts of the seal hunters.[*] The West side of Lobos is steep-to, but on the East side is a detached, partly uncovered reef, which extends E. ¼ S. nearly a mile from the shore. Large vessels should not approach the North end of Lobos nearer than 3 cables.

Between Lobos and the main there is a channel 4½ miles wide, with a depth

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[†] The seal-fishery is farmed out by the government. It is said that the lighthouse was removed from Lobos Island to East Point because it disturbed the seals! and it was also stated that measures were to be taken for its restoration (1870). It will then be altered to a flashing light.

of 10 to 15 fathoms, mud, with sand and mud. This channel, however, had better be avoided in light winds with a swell, as the currents are stronger than in the offing.

In 1877 an American vessel was said to have struck on a sunken rock of 3¾ fathoms, about 9 yards in diameter, with 15 fathoms, sand, close around, lying 21 miles South of Lobos Isle. This shoal was unsuccessfully searched for by H.M.S. *Rifleman* in July and August, 1881. A further search was made by H.M.S. *Firefly* in December, 1881, without finding any indication of shoal water within a mile of its reported position, the depths being 13 to 15 fathoms.

The *Morro San Ignacio* is a lofty and remarkable summit, which rises over a series of undulating hills, named *Asperezas de Maldonado;* it lies 19 miles N. by W. of San José Ignacio, or Piedras Point. *Los Tres Cerros*, a hill with three summits, lie 5 miles to the S.W. by W. of it. The *Cerro de Carapé*, at 19 miles northward of East Point, is of moderate height, and has a rounded top.

MALDONADO BAY, 5½ miles wide by nearly 2 miles deep, is formed by East Point and that of Ballena. It is exposed to S.W. winds, which cause much sea, but a portion of the bay is sheltered by the small Island of Gorriti and by the patch of the Monarch Rock. On the beach, North of Gorriti, is a wooden pier for shipping limestone, and inside East Point is a small sandy cove; the latter is the only place at which supplies can be shipped when the surf is on the beach after S.W. winds.

The shores of the bay are clean, with the exception of *Arecife* or *Granite Point*, 2 miles westward of the pier, which is rocky. The small town of *Maldonado*, which gives its name to the bay, stands on the brow of a hill about 200 ft. high, three-quarters of a mile from the beach, with a population of about 1,500 inhabitants. It is conspicuous by a square tower, about 120 ft. high, painted white, with a red base. *San Carlos*, or New Maldonado, a town of about the same size, is 7 miles farther inland. Between this town and the wooden mole is the cemetery, known by its dome.

Gorriti Island, which gives shelter to the anchorage, is nearly a mile in length, North and South, and averages about 3 cables in breadth. It is low, of sand and rock, and has a small bay and beach on its West side. Some small batteries, and a storehouse for the produce of the seal fishery, existed here in the beginning of the century, but are now in ruins. A rocky ledge extends a cable off its N.W. end, steep-to, with 6 fathoms water alongside them, and a sandy spit 4 cables off its N.E. end, which must be carefully avoided.

At nearly half a mile W. by S. from East Point is the outer edge of a reef of rocks, about 3 cables in diameter, with only 1 fathom least water over it, and on which the sea always breaks. *New* or *Parker Rock* is a shoal about a cable in diameter, with 4¼ fathoms least water on it. It lies S.W. by W. ⅝ W. distant 1¼ mile from the lighthouse on East Point, and S. ½ E. 7 cables from the South point of Gorriti Island, with Maldonado Tower over the first rock on the West side of a sandy cove at the South end of Gorriti; and the wooden hut on East Point once and a half the breadth of the salt-mill open southward of it.

The *Monarch* is a rocky patch with 3 fathoms water on it, but probably less, which would bring up a vessel of large draught. This shoal lies half a mile W.N.W. of the N.W. point of Gorriti, leaving between a channel 3 cables in breadth, with 7 fathoms water. The leading mark through is the dome of the cemetery over the pier, bearing N. by E. The Maldonado Tower over the pier N.E. by N. leads 2 cables westward of it.

There are no tides in Maldonado Bay; strong southerly and S.E. winds raise the water 6 ft., and the opposite winds depress it.

Vessels of any size may anchor in safety in 5½ fathoms water, sand over stiff mud, with the N.W. end of Gorriti Island from S. by W. to S.W. ½ S., and Ballena Point about W. by N. Small vessels may anchor with the N.W. point of Gorriti S.W. ½ S., the N.E. end S.S.E. to South, and the pier N. by W. to N.N.W., clay and stiff muddy bottom, with layers of sand. In all cases when necessary to moor, it should be with open hawse to the S.W.

A *pilot* resides at East Point, and is a general pilot to Buenos Ayres, &c. Pilot cutters are also frequently off this bay, having both Buenos Ayrean and Monte Videan pilots on board; they are mostly English, Americans, or Italians.

Water may be obtained from a small running stream, about 150 yards eastward of the pier. From between the banks it is excellent, by sinking a tub to put the hose in. Fresh beef and vegetables may be had at very moderate prices. Live stock is reasonable, and cheaper than at Monte Video.

A vessel bound into Maldonado Bay may pass on either side of Lobos Isle, avoiding the reef extending from its East side. East Point will be known by the lighthouse, and by a large dark wooden framework at its extremity. If southward of Lobos Isle, the town and tower of Maldonado will be seen, and probably the Pan de Azucar, and the Sierra de las Animas N.W. of it. Having passed the isle, East Point should not be brought to bear eastward of E.N.E., and when Maldonado Tower is open of the S.W. side of Gorriti Island, bearing N. ½ E., haul up for either channel, keeping the Pan de Azucar open of Ballena Point.

Ballena Point, at the West extreme of the bay, is bold, and may be passed at a prudent distance. In working into the bay from the westward, a vessel may stand into 6 fathoms water, at the distance of a long half mile from the shore; and in approaching the Monarch, keep the Pan de Azucar northward of the saddle on Ballena Point.

Potrero Bay, West of Ballena Point, and between it and Level Point, is 9 miles in extent. The bay is clear, and affords anchorage with off-shore winds. The white sandy beach in the bay forms a good mark for this part of the coast.

Punta Negra, or *Black Point*, which presents an East and West headland or frontage 2½ miles in extent, is formed by three rocky points, separated by two small sandy bays. The eastern point is named *Raza* (Level), the centre *Negra* (Black), and the western *Iman* (Magnet). They are all steep, and are overlooked by the high grounds which are connected with the Pan de Azucar. After having rounded Iman Point, the shore trends to the N.N.W., and at 3 miles is the rocky *Punta de Burros* (Donkeys); the small bay which lies between is called *Puerto Inglezes*. At 5 miles W.N.W. is the *Punta de la Sierra*, or *Animas;* it is low, and a reef of rocks extends 2 miles off it.

Pan de Azucar.—To the N. by W. of Punta Negra, or Black Point, is a mass of mountains, of which the culminating points, the *Pan de Azucar* and the *Sierra de las Animas*, are the highest summits of all this coast. They may be seen in fine weather at a distance of about 40 miles, and are consequently of great utility when a vessel makes the land in the parallel of, or to the S.E. of Lobos Islet. The Pan de Azucar, as its name indicates, is a nearly regular cone, and rises 1,375 ft. above the sea at only 3 miles from the beach; it is of granite, and is black, arid, and isolated.

The Sierra de las Animas lies 4½ miles to the N.W. ¾ N. of the Pan de Azucar, and rises still higher (1,765 ft.), but its summit is flattened, and has a slight depression in the form of a saddle, which is visible when seen bearing W.N.W.

PUNTA de AFILA lies 6 miles westward of Punta de la Sierra, with a clean sandy beach between. This point takes its name from some conical hills close at hand, called Piedras de Afila (whet-stones) in which are quarries of this sort of stone.

Afila Bank, or *Isla Chica*, is a reef of stones nearly awash, with its outer edge 1½ mile South of Punta de Afila. It is surrounded by breakers, and covered at high tides. *Solis Bank*, 3 miles eastward, lies 3 miles off shore; it is rocky, 4 cables long East and West, and 2 cables North and South. It is awash, covered at high tides, and the sea breaks on it constantly.

Punta de Piedras Negras, the next salient point, is double, and lies about W. ½ S., 10 miles from that of Afila. A rocky shoal, less than that of Afila, lies S.E. at a short distance from Piedras Negras.

La Playa de Santa Rosa, an extensive gravel beach, ranges for 19 miles beyond to the S.W. by W., as far as *Punta Buceo*, or *Carretas Point*, which has a reef stretching half a mile off. It is rather sinuous, but clean and steep-to. The sea is very heavy along this coast in all winds between South and East, and the strong currents would drive a ship bodily ashore. Several vessels have been lost here, and their crews have perished, not from rocks, but from the heavy surf that breaks on this steep shore.

FLORES ISLE and Light.—Flores Isle is a good landfall, and one always made; it lies 8 miles E. by S. of Carretas Point, and 51 miles about W. ⅜ S. from Lobos. The islet is 7 cables long N.E. and S.W., and 2 cables wide. It is low, but has a slight eminence in the middle and at each end. The coast is steep-to, except to the N.E., where a reef projects half a mile; there is anchorage all round the islet, but the best is to the W.N.W. at half a mile off shore, in 5 fathoms water, mud. An electric telegraph cable connects this island with the office of the captain of the port at Monte Video, and vessels may communicate their wants thereby.

On the most elevated point of Flores Islet, to the S.W., which rises 50 ft. above the sea, is a white lighthouse, 65 ft. high, which shows a *revolving bright* light *every minute*, elevated 104 ft. above the mean sea level, and visible 12 miles in clear weather.

Flores Islet is now used as the *Quarantine Station* for vessels frequenting Monte Video. The lazaretto is built on the West side of the islet.

About three-quarters of a mile S.W. by W. of the islet is an apparently isolated rock, having only 17 ft. over it, on which H.M.S. *Cumberland* struck. There is a depth of 5 fathoms between the rock and the shore. This danger should be carefully avoided.

The British ship *Camillia* was reported to have struck on a 12-ft. rock, with 4¾ fathoms, muddy bottom, around, 2¼ miles W. by N. from Flores lighthouse, but a subsequent search for it by H.M.S. *Firefly*, in January, 1882, was unsuccessful. Seven days were spent in sounding over and around its reported position, and it is possible that the vessel may have struck on Sara Bank, the depth and the bearing of the two dangers from the lighthouse being the same, though they differ 1½ mile in distance. It is considered not to exist.

From a survey by Commander A. T. Mahan, U.S. steam-vessel *Wasp*, 1874, the following dangers were found to exist westward of Flores Island. All the space between Point Buceo and Flores, although 7 miles wide, appears to be doubtful ground, and should be avoided. The currents are also stronger in this channel than South of Flores.

Sara Bank, a rocky shoal of 9 ft., about 2½ cables long, lies 4½ miles W. ¾ N. from Flores Island lighthouse, and 1 mile S.W. by S. ½ S. from Mark Rock, the eastern extremity of Carretas or Pipas Reef.

Carretas or *Pipas Rocks*, a cluster rising to the height of 10 ft. above low water, lie with their western extremity 1¾ mile E. ½ S. from Carretas Point, and extend thence 4 cables E. ½ N. The eastern rock, *Mark Rock*, is distant 5 miles N.W. by W. ¾ W. from Flores Island lighthouse, and is visible from a vessel's deck 3 miles, showing dark against the white beach. Rocks awash extend 1½ cable East of Mark Rock, and another rock awash lies 2 cables North of it. Rocky and broken ground of 6 to 12 ft. extends 3½ cables northward of Carretas Rocks, which are steep-to, with one or two outlying sunken rocks on the southern and western edges.

Bump Shoal, of 4 ft., is separated from Carretas Reef by a channel 2½ cables wide, having a depth of 4 fathoms, mud. The shoalest part, which consists of pointed rocks covering a space of 1½ cable, lies 3½ cables E. by S. ¾ S. from Mark Rock. Bump Shoal, within a depth of 4 fathoms, is 4 cables long, E. by N. and W. by S. This shoal rarely breaks, and is therefore more dangerous.

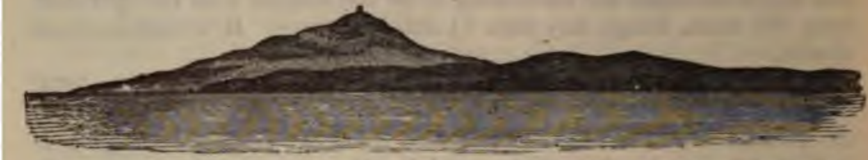
Buceo Bank and *Doynel Rock*, said to lie respectively 5½ miles N.E. by E. ½ E., and 6 miles East of Buceo Point, could not be found during a minute search made by the boats of the *Wasp*.

Forest King Reef, with 7 ft. water over it, on which a ship of that name struck in 1867, is 5 cables long, N.W. ¾ N. and S.E. ¾ S., and 1½ cable broad. From its southern extremity, Mark Rock bears N.E. ½ E., Luz Islet N.W. by N., and Flores Island lighthouse W. ¾ N., 5¾ miles distant. The reef is steep-to. Between Carretas and Forest King Reefs there is a safe channel, a mile wide.

Luz Islet.—A long narrow cluster of rocks, having rocky and uneven ground a quarter of a mile distant on all sides, extends half a mile S.E. from Carretas Point; the high rock, called Luz Islet, is 4 cables S.E. from Carretas Point, and is generally about 5 ft. above water; during a very high river the rock may be awash.

In working out of the river, Flores Island light should not be brought to bear southward of East until two remarkable single trees, about 3 miles to the north-eastward of the entrance of Toledo River, are in line bearing N. ¾ W.; this mark leads eastward of the shoals off Carretas Point.

BASSURAS BAY, formed between Carretas and Brava Points, is 4¾ miles in extent, and 1½ mile deep; it includes five small bays, separated by as many points of rock. Near the middle of the bay is the small islet of Meldroza, between which and the main is an anchorage for coasters in 3½ fathoms.



Punta Brava, W. by N. by compass, 12 *miles, and Monte Video Lighthouse appearing over it.*

Buen-Viage Rocks are nearly circular, about half a mile in diameter. From the East end Brava Point bears W. by S. ¼ S., 1¾ mile, and the Cerro de Monte Video W. by N., 7 miles. The shoal is marked by *three buoys*, namely, a bell buoy, on the eastern extremity, in 4 fathoms; a buoy on the north-eastern extremity, in 4 fathoms, 5 cables N.E. from the bell buoy; and a buoy on the western extremity, in 3½ fathoms, 5 cables W. ½ N. from the bell buoy. A rocky patch lies half a mile W. by S. from the western extreme of the Buen-Viage Rocks. The navigator is recommended to approach this part of the coast with great caution, as the river has not been regularly surveyed.

PUNTA BRAVA is so named, doubtless from its form and from the dangers that surround it. It is low, and terminated by a reef extending half a mile to the southward; at its extremity is a detached rock awash. Ships should round Point Brava at 1 mile off at least, and more by night or in foggy weather; it is the most salient point towards the South, and lies W. ½ S. from Flores.

Light.—On Punta Brava is a white lighthouse, 82 ft. high, showing a *fixed bright* gas light, visible 10 miles.

Punta de la Caleta is 2¾ miles W.N.W. of Punta Brava, and forms the S.S.W. extremity of the peninsula of Monte Video. The coast between is rocky, and forms a bay three-quarters of a mile deep; in the middle of this bay is a small sandy cove, named Caleta Chica, or Pocillos. The West point (named *Perez*), and *Gabriel*, are the only ones which have any small reefs off them. The *Hydra*, *Griffon*, and another 10-ft. rock between them, lie at 1½ cable from the shore, between Sarandi and San José points; they should be given a good berth as the vessel passes up to the inner anchorage in Monte Video Bay. Griffon Rock, off Point San José, and Hydra Rock southward of it, are each marked by a *red* conical buoy, moored half a cable West of the rocks.

MONTE VIDEO BAY is in form almost circular, its diameter being 1½ mile, and having an opening over one-quarter of the compass towards the S.W. It is comprised between San José Point on the East and Punta del Rodeo on the West, 1½ mile apart, and sheltered from all winds from West round northerly to S.E. The eastern shore of the bay is a beach of fine sand, with a few rocky points; the western, at the foot of the Cerro, is entirely rocky.

The bottom all over is of very soft mud, with a few patches of rock; the depth varies from 15 to 10 ft.; the bay, which is imperfectly sounded, can therefore only admit vessels of comparatively small draught of water.

The harbour, so called, is a small space of less than half a mile square, close off the N.W. face of the town, with a depth of 19 to 14 ft., mud. A breakwater, 250 yards long, extends N.W. by W. from the shore near San José Point; this breakwater is in course of extension in a W.N.W. direction for 300 yards farther; a buoy is placed at the extremity of the stones. Since the building of the breakwater, the port is said to be gradually filling up, and vessels have to anchor farther out, with necessarily less shelter from the land.

There are some islets and patches of rock within the bay. *Ratones* or *Rat Islet*, to the N.W., was formerly fortified, but now is used only as a storehouse, and occasionally as a lazaretto; it is surrounded by rocks and shoal water to the extent of a cable's length. At 4 cables S.E. by S. ½ S. from Ratones is a reef awash, at very low water, named *Sarina*, and marked by two conical buoys, a *red* buoy moored in 10 ft. on the West side, and a *black* buoy in 11 ft. on the East side. On the East side of the rocks a *white* conical buoy is moored in 12 ft.; the ground near and around this buoy is rocky and unfit for anchorage. There is a rock, sand-bank, or wreck, on which a vessel grounded in 1865, lying 1½ cable N.E. by N. from the shoalest part of Sarina Rock. Another patch about a cable in extent, lies 3 cables to the North of Ratones; and a rock, having 7 ft. water over it, lies 3½ cables to the eastward of Ratones Island. On the East side of the bay, at three-quarters of a mile North of the mole, is a group of rocks named *Familia*, marked by five small *red* buoys.

The wreck of an iron ship sunk into the mud, and having 16 ft. water over her, lies with Cerro lighthouse N.W. by W. ½ W., Rat Island N. by W. ½ W. A *red* conical buoy lies N.E. by E. ½ E., 1½ cable from this position. Vessels should anchor clear of the wreck.

A *red* buoy marks the position of a rocky plateau, recently reported in the outer road. The buoy lies in 20 ft., with Cerro lighthouse bearing N.N.W., and the Cathedral East tower N.E. by E. ½ E. The plateau extends half a cable N.N.W. from the buoy, and is 20 yards wide.

El Cerro, or **The Mount**, is the distinguishing feature of the port. It rises on the western side of the bay in the form of a regular, isolated, bare cone, to a height of 465 ft., at less than three-quarters of a mile from the beach. It is crowned by a fort, on which there is a lighthouse. The Cerro is useful to the mariner on all occasions, as a conspicuous and easily recognised landmark.

SAN FELIPE de MONTE VIDEO, the capital of Uruguay, stands on a gently rising ground on the East side of the bay, at its entrance, occupying a small peninsula. The principal building is the cathedral, which may be seen at a long distance in the offing. The houses are mostly of one floor and flat-roofed; the streets cross each other at right angles, and are paved, and lighted with gas. Several handsome public buildings and markets have been erected of late years. The custom-house is on the North face of the town, near which some small moles project into the bay. On the West side of the town is the small fort of San José at the entrance.

Consuls of all nations reside here, and there is an English church on the

South side of the town. The population of the city and the immediate neighbourhood, in 1872, was about 100,000. Labour and materials for any kind of repairs are extravagantly dear.

The exports consist principally of wool, hides, preserved meat, &c., the total value for the year 1876 amounting to upwards of £4,000,000. The imports from Great Britain are cotton and iron goods, coal, and provisions, their value in 1876 amounting to £1,062,679.

The number of vessels that entered here in 1876, exclusive of coasters, was 1,664, amounting to 980,202 tons, of which 320 (227 steamers and 93 sailing vessels), amounting to 412,305 tons, were British. In 1880, 384 steamers and 692 sailing vessels, with a total tonnage of 794,443, entered. The light and port dues are very high: a vessel of 515 tons, discharged and loaded, paid over £76 in 1876. The European mail steamers calling here amount to about 24 every month, and the Brasilian *telegraphic* system is extended to this port, and Buenos Ayres.

Docks.—A dry dock is situated at *Lobos Point*, the S.W. extremity of Monte Video Bay. It is 450 ft. in length, with an entrance 55 ft. wide, and has a depth of 16½ ft. on the sill at ordinary low water, or 20 ft. at high water. It can be divided into two compartments by means of inner gates, the inner one 255 ft. long, and the outer 195 ft. There is another dry dock in the bay, capable of docking a vessel drawing 15 ft., and 275 ft. long. There is also a slip for vessels of 300 to 400 tons. The harbour is being improved by dredging.

Railways are being constructed from Monte Video into the interior. From the Central Railway a branch line is being constructed to Colonia, and thence to the port of Higueritos, on the River Uruguay. Several others are being pushed forward, and should prove of great benefit to the country. There are four tramways to the suburbs, which are all doing well.

Water and other supplies may be got easily at Monte Video. Several small streams run down the slope of the Cerro; the most convenient is that halfway between South-east Point and the Punta del Cerro. Water, procured from a distance of 36 miles, is also brought off from the town at about 1½ dollar per ton. Coal can always be obtained at about 50*s*. per ton.

LIGHTS.—A *fixed* and *flashing bright* light, showing a flash *every three minutes*, which lasts for 15 seconds, preceded and followed by a short eclipse, is exhibited from a light-tower within the fort on the summit of the Cerro, at an elevation of 486 ft. above the sea, and should be visible, in clear weather, at a distance of from 20 to 25 miles. This light, on account, perhaps, of its great height, is not to be depended upon.

A *bright* light is also shown at 147 ft. above the sea by the dial-plate of the clock in the S.E. tower of the cathedral having been lighted by gas. This light is visible from 6 to 10 miles, and enables vessels to anchor in the outer road at night, by cross bearings of the two lights.

The Anchorage for large vessels in the road at Monte Video is about 2 miles southward of San José Point, in 22 ft. water, mud, with the Cerro bearing about N.W. ½ N., and the cathedral N.E. or N.E. by N. Vessels may anchor farther in as convenient, and those of light draught in the inner anchorage, in from 9 to 14 ft. water, mud.

Captain Sir Thomas S. Pasley says:—"Vessels which can depend on their anchors and cables may safely anchor in the road of Monte Video in the same depth of water as they draw, provided the river is at a mean height, for, whenever the wind sets in from the southward, the water rises sufficiently, and the bottom being so very soft, 3 ft. more than the vessel's draught is amply sufficient to ride out the heaviest gale without injury." The sailor will, of course, keep clear of his anchor.

If vessels moor it should be with open hawse to the S.W., that being the quarter from which the pampero blows strongest.

Tides.—There are no regular tides at Monte Video; in fine weather there may be a set of a quarter to 1¼ mile an hour, but its direction is uncertain, and the water rises and falls occasionally as much as 4, 6, or even it is said 8 ft., but this is entirely due to the wind, the water rising with East, S.E., and S.W. winds, and falling with those from the opposite quarters. The water forced into the bay by the first part of a strong S.W. wind is heaped up, and rushes out, three or four hours after the wind has commenced to blow, as a counter current round Point San José, causing vessels to ride across the wind, to roll much, and frequently to part their cables and go on shore. The bottom, however, is so soft, that they get off again without damage to the hull.

Lobos Point, the South extreme of the Cerro or Mount, and of the bay on the West, has some rocks off it to the distance of 4 cables, known by the name of Piedras Blancas, or White Rocks. A bell buoy, in 20 ft. water, 5 cables from the point, marks the extremity of the foul ground. From the buoy the Cerro lighthouse bears N. ¾ W., and the cathedral E. by N. ¾ N. It has been proposed to make this reef the base of a breakwater, and to build a slip on the northern side.

The coast from Lobos Point trends to the West, forming three rocky points, the westernmost of which, named Yeguas, is low, in the form of an islet, and joined to the main by a tongue of sand, with a reef on the East side, but steep-to on the South. Assuming a N.W. by W. ¼ W. direction for 7 miles the coast forms six small sandy bays, separated by rocky points, three of which are named respectively Tomador, Pedregal, and Castro Points.

ESPINILLO POINT is the southern limit of the embouchure of the River Santa Lucia, and the western termination of the elevated ground, which, at its south-eastern end, rises into the mount. Its extreme point is low and rocky, and shoals extend three-quarters of a mile to the S.W. of it. Vessels should not approach Espinillo Point within a mile, as the currents are strong and uncertain. H.M.S. *Dart*, in 1872, grazed a shoal of 12 ft. depth lying about 2¼ miles W. by S. from Espinillo Point.

The Panela, a dangerous reef, about 2 or 3 cables in extent, lies about South from Espinillo Point, distant 5 miles; and W. by S. ¾ S. from the Cerro of Monte Video. With the river in its mean state the shoalest water on the Panela is 3 ft., but with a northerly wind producing a low river, the rocks have been seen 3 or 4 ft. above the water. This reef requires to be properly surveyed, and its position fixed from the shore.

A Lightvessel is moored at about a cable north-westward of the shoalest part of the Panela Reef, and exhibits a *fixed bright* light, 17 ft. above the sea, visible 5 or 6 miles. In 1872 there was the wreck of a paddle-wheel steamer on this reef, and the paddles could be distinctly seen at a distance of

6 miles. A stranger sighting the lightvessel for the first time would probably take her for a steamer, unless the wreck has disappeared.

The lead gives no warning of approach to the Panela; all around there is a depth of 3½ and 4 fathoms, mud. A vessel in the vicinity of the reef by day, in clear weather, and the lightvessel not in her place, should keep the Cerro lighthouse northward of an E.N.E. bearing until the westernmost white patch on Espinillo Point bears eastward of N. by E. ½ E. To pass between the Panela and the Santa Lucia Bank, keep the cathedral entirely masked, or the Cerro lighthouse to bear a little eastward of E. by N.

Santa Lucia River has its outlet between Espinillo Point to the South, and Tigre Point to the North. *Santa Lucia Bank* is a sandy flat thrown out by the river to a distance of 7 miles from the shore. At the entrance of Santa Lucia River there is a rock awash, marked by a buoy. The holding ground is good off the river.

The Coast to the westward of the River Santa Lucia, called the *Rincon de Alcibar*, is formed of sandy cliffs, from 70 to 100 ft. in height, extending 22 miles in a W. ½ N. direction, under the names of *Barrancas de Sta. Lucia*, *de Mauriçio*, and *Santa Maria* or *San Gregorio*, the latter being a comparatively high, dark bluff point, with two or three houses on its summit.

Between Santa Maria Point and *Sandy Point*, 4 miles W. by N. of it, a small curved sandy spit, with 9 and 12 ft. over it, extends 3 miles off shore; at 8 miles to the eastward, opposite the outlet of the River San Gregorio, is said to be another shoal spot of 12 ft. Vessels often complete water from alongside in this vicinity. Game is plentiful on this coast.

To the north-westward of Sandy Point a sandy beach continues, with downs at the back from 30 to 90 ft. high, as far as the outlet of the rivers *Pereyra* and *Pavon*, which is the limit of the 3-fathoms navigation in this quarter. The spit of the Great Ortiz Bank here leaves the shore in a S.S.E. direction, and forms a *cul de sac*, named the *Ensenada de Pavon*, where there is a rather exposed anchorage for vessels in 3½ fathoms, mud. There is an inshore channel between the great mass of the Ortiz Bank and the land, for vessels that do not draw more than 12 ft. water, for 37 miles to Colonia. At the *River Cufré*, 6 miles beyond the Pereyra, the coast changes from a N.W. ½ W. to a general W. by S. direction, and so continues to Colonia. A few small rocks lie off the point of the River Cufré.

From the River Cufré westward there are three points. The first point, *Rosario*, formed by the embouchure of the river of the same name, is low, and not easily distinguished, the hills between reaching the height of 140 ft. *Sauce Point* is easily made out, as it is the most wooded on this part of the coast. Some small rocks, partly uncovered, lie about half a mile off the point to the S.E. Coasters may anchor under the lee of this point, sheltered in winds from S.E. to North. *Artilleria Point*, at 5 miles W. by S. ¾ S. of Sauce Point, is bordered by rocks, which extend 4 cables to the southward.

Another rocky point, called *Punta Angostura*, succeeds, then the outlet of the *Rio Chuelo*, and 2 miles to the westward the *Lagunas de Patos*, off which the water deepens to 3, 4, and 6 fathoms, which latter depth is carried up until Colonia lighthouse bears about North.

Las Pipas Rocks, 6½ miles W. by S. ½ S. of Artilleria Point, and 2 ft. above water, lie 1¾ mile off shore, and extend 1½ mile East and West. These rocks take their name from their similarity to barrels floating on the water. At 1½ mile N.E. of Las Pipas is another reef, 1 mile from the shore.

La COLONIA del Sacramento is built on a slightly elevated peninsula point, to the westward of which extend some islets and reefs, which shelter the roadstead. The N.W. point of the peninsula is named *San Rita*, and the S.W. point *San Pedro*. A considerable trade in hides and wool is carried on here, principally in coasting vessels; meat and game are cheap and plentiful. There is a patent slip on the N.W. side of the peninsula for vessels of large size; and a dry dock is attached capable of receiving a vessel of 1,000 tons.

Vessels drawing 18 ft. can find good anchorage here, but the reefs which shelter the road from the West and South make the entrance difficult, and render it necessary to take a local pilot. If necessary to moor, it must be with open hawse to the S.S.W. At this anchorage vessels are sheltered from winds from the North, round by East, to S.E., but the only protection against S.W. winds are the off-lying islet of San Gabriel and the Laja Bank. The bar at the entrance to the roads is composed of hard sand and rock, but the bottom on either side is of soft mud; the least water found on the bar was 18 feet.

Hornos Islands afford excellent shelter from S.W. winds round by South to E.S.E. The strongest winds are from the westward, but then there is less sea, and they are not felt so much as those from S.E. to E.S.E. There is good anchorage on the North side of Gabriel Islet, but vessels of large draught should moor. Coasting vessels in this vicinity, when overtaken by bad weather, seek shelter here.

Lights.—The lighthouse at Colonia is a white building at the S.W. angle of the plaza. It shows a *bright revolving* light, attaining its greatest brilliancy every *three minutes*, at a height of 110 ft., and visible 10 miles.

A *fixed bright* light, elevated 83 ft., and visible 12 miles, is shown from a lighthouse, 98 ft. high, on Farallon Island. A floating pontoon Pilot Station is placed 6 miles S.S.W. from Farallon Islet, and shows a *red* light by night, and a blue flag with white square by day. This vessel has been temporarily withdrawn.

Islets off Colonia.—*San Gabriel Islet*, 1½ mile to the West of Colonia, is low, slightly wooded, and half a mile long by 2½ cables broad. At a quarter of a mile to the eastward is the *Laja*, a rocky bank, which breaks in a strong breeze. A rocky patch of 18 ft., with 5 fathoms around it, was reported by H.M.S. *Garnet*, in 1880, to lie about 11½ cables E. ¾ N. from Farallon Islet lighthouse. The *Farallon* is a rocky islet 12 ft. high (it is said to be 35 or 40 ft.), which lies 1½ mile S.W. by W. of San Gabriel, and is surrounded by a reef. A rock of 2½ fathoms lies 1½ mile W. by S. from Farallon.

Lopez Islets lie East and West about 2 miles W.N.W. of Colonia; they are bare rocks, 8 and 10 ft. high, each in the midst of a long sandy flat or spit, which extends to the N.W. beyond Hornos Islands. At 1½ cable North of the East islet H.M.S. *Comus*, in 1847, was hove down to repair damages, as being the most sheltered spot on this part of the coast.

There are three or four small shoals shown on the chart, but the outer is *Beaumanoir Reef*, at 2 miles W. by N. of San Gabriel, which has one spot with 12 ft. on it. It bears from Lopez West Islet S.W. by W. ½ W.

Fishers Bank, the N.W. spit of the Ortiz Bank, also called the N.W. Pescadores, has some 10 and 12 ft. patches on it, and forms the shelter to Colonia Road on the South. Fishers Bank is reported to have extended to the westward; the lighthouse on Farallon Island should not be brought to bear West of North, until within 2 miles distance of that island, when the course should be gradually altered to the eastward to clear the S.E. part of Farallon Reef. The West end of Lopez West Island shut in with the West end of San Gabriel Island, leads eastward of Farallon Reef.

The great *Ortiz Bank*, or flat of muddy sand, is an important submarine feature, and stretches three parts across the La Plata; it extends from Colonia to the eastward along the North shore for about 37 miles, while its eastern 3-fathoms edge trends to the S.S.E. 35 miles out into the river, forming a bank or flat of more than 600 square miles, the depth over it, as far as it has been sounded, being from 9 to 12 and 15 ft.

Along shore, at its northern edge, is its deepest part, and coasters and small steamers can carry 12 ft. through this inshore channel to and from the roadstead at Colonia.

Directions.— In steering for Colonia from the S.W., bring the West end of San Gabriel to bear about N. ½ W., and steer with it on that bearing until a conspicuous five-windowed, one-story house on the beach comes between the cathedral and a windmill to the southward of it, exactly filling the apparent space between. This mark leads between the N.W. end of Fishers Bank and San Gabriel Island in 18 ft., low river.

When the whole of Lopez West Island is open East of San Gabriel Island, steer East, until the windmill comes in line with the lighthouse at Colonia; keep this mark on until the East extreme of Middle Hornos Island is in line with the West extreme of Lopez East Island, which leads into the best berth in the roads, anchoring with the whole of Farallon Island open southward of San Gabriel Island, in about 4 fathoms, stiff mud.

No sailing vessel should attempt to work through; and all vessels should allow for the current, which at times sets strong towards Fishers Bank.

Hornos Islands lie 2 miles N.W. by N. of Lopez Islets; they consist of three small low islets, lying in an East and West direction, with a channel of 16 to 19 ft. between the two eastern. Near the western end of the bank, on which the central and western islets are situated, is a 2-fathoms rock. The best anchorage is 3 cables N.N.W. of the western islet, in 18 ft., mud.

The RIVER URUGUAY, the entrance to which is beyond the rocky island of *Martin Garcia*, which lies 25½ miles N.W. by W. ¼ W. from Colonia, rises in Brasil, in the Sierra de Santa Catharina, and flows first West and then South, separating Brasil and Uruguay from La Plata, and falling into the Rio de la Plata, where its waters preserve their clearness for miles before they are lost in the muddy current of the Parana. Its whole length is nearly 900 miles, and it is usually navigable for vessels of about 12 ft. draught as far as Salto, 220 miles above Buenos Ayres, but in times of flood the steamers ascend the rapids and go up as far as Uruguayana and San Borja, in Rio Grande province of Brasil. The river is subject to periodical rises, occasioned by the great rain in springs in the Brasilian provinces, where it takes its source. It rises in September and October, sometimes very rapidly. The entrance of the Uruguay is 20 miles N.W. by N. of Martin Garcia. Pilots may be had at Monte Video and Buenos Ayres.

A regular communication is established between Buenos Ayres and the principal towns of the Uruguay, as far as Salto.

The RIVER PARANA rises in Brasil, N.W. of Rio de Janeiro. The upper streams of this river have various names; but at the confluence of the Rio Grande, the longest of them, with the Parañahiba, it takes the names of Paraña, which it retains till it merges itself into the Rio de la Plata. The Paraña flows southward, receiving several large affluents, and separates Paraguay from Brasil and La Plata. It then turns to the West, and flows in that direction for 50 miles, still forming the boundary between Paraguay and La Plata. It receives the Paraguay from the North, and at 13 miles to the S.W., at Corrientes, it again turns South, and flows through La Plata into the river of that name. Its total length is about 2,040 miles.

The Parana and its affluents are subject to a periodical rise, caused by the melting of the snow on the Cordilleras, in January to March, and by the great rains which fall at nearly the same time in the Brasilian provinces, which then permits vessels of 14½ ft. draught to reach Corrientes, and those of 8 ft. draught the Brasilian province of Matto Grasso, in lat. 18°, at about 2,000 miles from the sea.

Rosario.—The only town of Paraña where vessels with foreign commerce have much interest is Rosario, a thriving town at 160 miles above the Boca de Guazu, with 12,000 inhabitants in 1881. The exports consist of bones, wool, hides, &c., and also maize and wheat. In 1878, exclusive of 1,444 coasters, 262 vessels with a total tonnage of 55,611 entered this port, of which 27 with a tonnage of 17,333 were British. There are piers for discharging cargo, and coal may be obtained from a hulk moored in the river; other supplies at moderate prices. There is telegraphic communication with Buenos Ayres and as far as Corrientes. Above Rosario there is little in the river to interest the commercial stranger.

As Rosario is the outlet for all the northern and western provinces, it has a great future before it. There are now 748 miles of railway in connection with the port; the main line running towards the Andes, where it will some day cross into Chile, and connect the Pacific with the Atlantic; and the narrow guage line to Tucuman. This latter railway, 548 miles long, with 22 side stations, starts from the city of Cordoba, where it is in connection with the Central Argentine Railway Company, and terminates for the present at the capital of the province of Tucuman.—*Mr. Consul Barnett*, 1876.

The total length of the Paraña is about 2,040 miles,—namely, 500 from the source of the Rio Grande to its confluence with the Parañahiba, 1,000 from thence to the union of the Paraguay and Paraña, and 540 from that point to the Rio de la Plata. In all the upper part of its course, as far as the province of the Missions, the river flows through a mountainous country, between scarped and tortuous shores, which renders it unnavigable. But below the Salto d'Apipe, the highest point a vessel can reach, its aspect and nature is quite opposite.

The mariner when bound up, or loading in any of the rivers, should take into consideration the vessel's draught, and the probable rise and fall of the river, or he may be detained for months. In 1870, H.M.S. *Cracker*, drawing 8½ ft., was detained at Corcordia, in the Uruguay, three months (June, July, and August) waiting for the river to rise; in some of the shallow passes there was only 6 ft. water.

The SOUTH COAST of the Rio de la Plata is low, uniform, and uncultivated; it is only visible from the offing by groups of trees which are scattered along the coast, making the navigation near it difficult, and on this account the northern side is preferred for entering, now that the chief dangers are marked by lights and beacons, whereas it was formerly much dreaded. The coast is the termination of the pampas of Buenos Ayres, immense monotonous plains, resembling the deserts of Africa, which extend to the chain of the Cordilleras, rising 420 miles to the westward. There is no other vegetation than the rare ombu tree, and no water but that of the marshes formed by the rain.

The complete absence of running water, and the saltness of the marshes produced by the great quantity of salt which is everywhere found on the soil, renders this country almost uninhabitable.

CAPE SAN ANTONIO.—*Rasa*, or *Flat Point*, the northern extremity of the ill-defined Cape San Antonio, the North end of a line of sandy downs, is a low sandy spit, extending to the northward and under water towards some breakers, near the north-eastern limit of the Tuyu Bank. In clear weather this part of the coast may be seen from a distance of 8 or 10 miles.

Tuyu Bank, called also Arenas Gordas, extends nearly 10 miles from the shore, and prevents even the smallest vessels from approaching this half-drowned land. The sea breaks on it at nearly 2 miles from shore, and on the North part of it, when the wind is from seaward. At 5 miles N.N.W. of the cape is a shoal patch of 6 ft., on which the sea breaks; and the flat on which it lies, called the Cabo Bank, is 6 miles long E. by N. and W. by S., with from 8 to 10 ft. water. With the lead going there is no danger.

SAN BORONBON BAY, formed between Cape San Antonio and Piedras Point, 55 miles to N.W. by N. ½ N., is about 20 miles deep, and very shallow. The coast along the southern part of the bay is nearly level with the sea, and can only be seen by the stunted brushwood scattered here and there. It is only northward of lat. 36° S., where it rises a little, but not exceeding 20 ft., that it is at all visible from the offing.

The Currents set into or out of the Rio de la Plata, varying in their strength and duration as the winds vary, by which they are principally governed. Generally speaking, the current sets to the northward about N.N.W., at from 1 to 3 miles an hour, before and during southerly winds; and to the southward about S.S.E., at the same rate, before and during northerly winds.

It is high water, on full and change, off the cape, at about 10^h; and the rise is about 6 ft. In fine weather the tides are regular, but with strong winds from the S.E. quarter, the water rises about 3 ft. above the ordinary springs, and it falls with the winds from the N.E. quarter.

At *Rasa Point*, which forms the south-eastern extreme of San Boronbon Bay, the low flat shore turns suddenly to the westward, forms a right angle, changes also a little in nature, and terminates suddenly, but so low that the beach of sand and shingle is almost blended with the sea.

The first remarkable group of trees, named *Isla del Juncal*, rises about two-thirds of a mile from the shore, in lat. 36° 1′ S. About 7 miles to the northward is the *Isla del Rodeo*, another group in lat. 35° 54′ S., and 8 miles southward of the mouth of the *Rio Salado*. *Mount Rosas*, a sandy down a little higher than the surrounding land, covered with trees, rises in lat. 35° 50′ S. to about 30 ft. above the sea. To the North of it is a brick-kiln.

The Rio Salado is a shallow bar river, unfit for any but small vessels. At times, when the Plata is high, there is 6, 8, or 10 ft. water on the bar; but at other times the smallest boat cannot even approach the mouth of the river. The *Rio San Boronbon*, at 2 miles northward of the mouth of the Salado, is a small stream, and often dry, but it has a large quantity of water during S.E. winds.

Between the Rio San Boronbon and Piedras Point N.N.E. of it, is a chain of small sandy downs, on which some trees are seen. The most remarkable is 6½ miles southward of the point, named *Mount Juan Geronimo*.

PIEDRAS POINT is the North extreme of San Boronbon Bay, and the South point of entrance to the Rio de la Plata. The point is low, and projects very little; it is composed, not of rocks, as its name implies, but of *tufa*, a species of friable compact sandstone, and appearing to be of hardened mud. This stone, known in the country by the name of *tosca*, is formed in various places on the coast as far as Buenos Ayres, and forms a girdle of dangerous banks of 5 to 6 miles mean breadth. It is as dangerous to vessels which ground on it as the rocky bottom of the opposite shore.

The banks which border Piedras Point to a distance of 8 and 12 miles, and the low nature of the shore, require the navigator to use the utmost caution in approaching the coast.

Piedras Point, and that of Indio, about 15 miles to the N.W. ¾ W. of it, is bordered by a bank of tufa and coarse gravel of from 6 to 8 miles in breadth.

When very near the edge of the bank, the *Cerro de Salvador Grande*, on which are some trees, the *Isla de la Observacion*, on which is a remarkable isolated tree, 1 mile from Piedras Point, and the *Isla del Espinillo*, situated more than 2 miles to the S.S.W., can be seen. *Memoria Point*, low, and a little projecting, lies N.W. 7 miles from Piedras Point. In estimating with the eye the distance from the coast in the La Plata, caution is required, as great errors may be made from the frequent effects of mirage.

INDIO POINT.—At about 5 miles farther on to N.W. by W. is Indio Point, and so low that a vessel can rarely close to recognise it. The pilots often mistake it for the Cerro de Salvador Grande. Indio Point is low, covered with brushwood, more rugged than the rest of the coast, and on its extremity is (or was) a large tree. To the S.W. are two groups of trees, and between them and the point is seen an uncultivated plain. The point may be seen, in clear weather, from a distance of 9 miles in 3¼ fathoms water. From Indio Point the low shore runs to the N.W. ½ W. for about 19 miles to Embuda Point.

By night it is necessary to navigate with the greatest care when near this point, as the currents are stronger here than in any other part of the La Plata, and the ebb tide sets on to the coast bank.

Lightvessel.—Between Indio Point and the Ortiz Bank, a vessel painted red, with three masts, having a red ball at the mainmast head, 40 ft. above the water, is moored in 3¾ fathoms, at the distance of 11½ miles N.E. by

[illegible]

[illegible] repaired [illegible] coming [illegible] available for [illegible]

[illegible] machinery [illegible] miles to the [illegible] place and [illegible] at low [illegible] the depth [illegible] the pier, as there [illegible] off the pier [illegible] It is intended [illegible]-head.

[illegible] at the old [illegible] No charges [illegible] Communication [illegible] Harbour. Punta Lara [illegible]

[illegible] is shelter from [illegible] from the N.E. [illegible] remarkable by a large isolated ombu. A little westward of the point is a cluster of underwood, and some hillocks forming the land of *Quilmes Point.* Between Barragan Bay and Buenos Ayres, a distance of 20 miles, the low grassy shore is partly inundated with a very high river, and cannot be approached nearer than 2 or 3 miles. *Quilmes*, the chief town or village of its department, stands on an elevation, and has a station on the Enseñada railway.

The *electric telegraph* from Buenos Ayres reaches Point Lara, and thence it is carried across the estuary to Colonia. The country between Buenos Ayres and Enseñada has only of late years been colonized, and is now covered with thinly-scattered grazing stations, and divided into partidos.

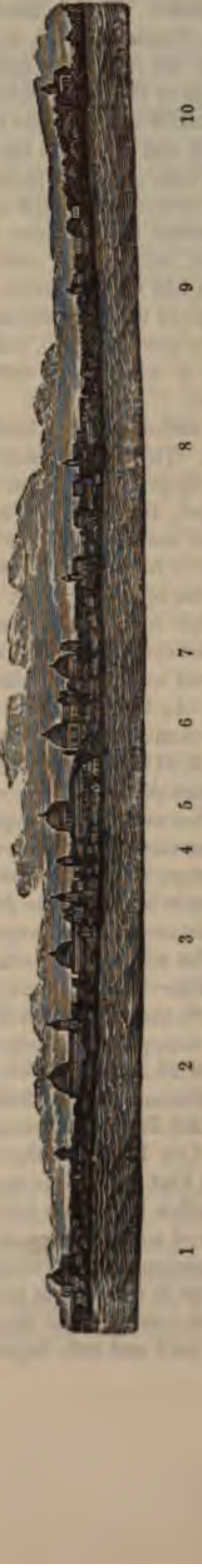
The *Partido do Ajo* is one of the south-easternmost of the Argentine Republic, and embraces the district around Cape San Antonio, with a population of about 3,000. The town and port of *Tuyu*, or *Lavalle*, which is the outlet of much of its produce, is 6 miles up the Ajo River, and 12 miles West of Cape San Antonio. It admits coasting craft.

The partido of *Castelli* is occupied with grazing stations. On the coast it extends from the Rio Salado for about 25 miles to the southward. To the North of it is the partido of *Rivadavia*, which extends to Magdalena.

The partido of *Magdalena*, extending from Piedras Point to beyond Atalaya Point, seems to be specially adapted for sheep farming. The village of Magdalena, previously mentioned, consists of about fifty houses and a church, state school, &c., and is on the borders of a lagoon, which empties its waters at Embuda Point. A small amount of coasting trade is brought here.

LAS PALMAS BANK.—The flat of Las Palmas is a great bank formed by the sand brought down by the Uruguay and the Paraña, which spreads over the whole of the upper part of La Plata. The depths over its outer part are from 2¼ to 2¾ fathoms, over its inner part from 1¼ to 1¾ fathom, and shoaling still more near the mouths of the

VIEW OF BUENOS AYRES, FROM THE ANCHORAGE IN THE OUTER ROAD.



REFERENCES.—1. *Residencia.*—2. *S. Domingo.*—3. *S. Francisco.*—4. *Cabildo.*—5. *Cathedral.*—6. *S. Miguel and Mole Head.*—7. *S. Merced.*—8. *Santa Catalina.*—9. *Socorro Chapel.*—10. *Recoleta Spire.*

great rivers. Vessels leaving the outer road of Buenos Ayres for Colonia or Martin Garcia Channel, should take into consideration the vessel's draught and state of the river, and steer to the eastward, borrowing either way towards the edge of the flat according to circumstances.

BUENOS AYRES, the capital of the province of the same name, was founded in 1535, and stands on the right bank at the head of the estuary of the Rio de la Plata, on a vast plain which is here about 35 or 40 ft. above the sea, and which extends westward to the Andes. The level uniformity of its outline is only broken by the spires of various churches. The streets are regular and straight, intersecting each other at distances of about 150 yards, forming squares like a chess-board. There are numerous tramways. The houses had never more than two stories, and commonly only one, but numerous new buildings are now rising up, and attempts are being made to drain the city, and supply it with good water. In 1881 the population amounted to about 195,000.

The cathedral has a handsome dome, and a portico with twelve Corinthian pillars. There are several churches, including an English one, and a Presbyterian chapel. From San Miguel Tower, 68 ft. high, a little westward of the cathedral, the true bearing of the North Cerro de San Juan on the Banda Oriental coast is North 39° 41′ 34″ E. There are two wharves or piers, 1,300 and 2,000 ft. in length—the first, near the church of La Merced, for passengers; the second, in front of the custom-house, for merchandise.

Buenos Ayres has a considerable trade. All kinds of supplies, including coal, but excepting meat, are at a very high price. The exports consist principally of wool, hides, tallow, and other productions obtained from sheep and cattle. In 1876-77 their total value was about £6,420,000. The imports, chiefly manufactured goods, amounted to about £5,500,000 in the same year. In 1876, 219 British vessels, with a total tonnage of 184,196, entered the port of Buenos Ayres. There are thirteen regular lines of steamers calling here, and it has electric telegraph communication with Europe, &c.

It has made great progress of late years. In 1859 there were only 6 miles of railway; in 1878, 1,409 miles, and 1,100 more in course of construction.

There is a proposal to join Buenos Ayres with Valparaiso by railway. The total distance by the proposed route, of which the railway from Rosario to Mercedes will form a part, is 1,100 miles.

Lights.—On the tower of the custom-house is a *fixed bright* light, visible 15 miles off, and at 4¾ miles E.N.E. from the custom-house is a hulk or stationary guard-ship, painted black, with three masts, which shows a *fixed bright* light, elevated 20 ft., and visible 7 miles. The lights at Buenos Ayres were temporarily discontinued in 1880.

OUTER ROAD.—There are two anchorages in front of Buenos Ayres, formed by the City Bank and that of the Camaron, an extension or tongue of the great Palmas Flat. Both are anchorages exposed to the winds from S.E. to E.N.E., which often bring in a heavy ground swell. Vessels frequently drag, foul each other, and sometimes go on shore. It is necessary to have good ground tackling, to be cautious not to ground on the anchors, and to give a berth to the buoys of vessels in the road to prevent grazing on their anchors. The bottom is a fine dark sand; within the 12-ft. line of soundings it is generally hard, and to 15 feet hard and soft, beyond 15 feet it is mostly soft muddy sand. There are always a large number of vessels lying here. The new port of Enseñada is described previously.

There are several dangerous sunken vessels in the roads; two nearly close together (now probably removed), showing at low water, lay in the outer road in line with the Catalina Channel, and one farther in, and were marked by beacons. The great or outer road northward of the City Bank, at about 3½ miles from the shore, is from 3 to 4 miles in length in a N.W. by W. ½ W. and S.E. by E. ½ E. direction, and from a half to three-quarters of a mile in breadth, with depths of 18 to 21 ft. over soft mud. At the entrance to this anchorage there is a bar or flat with only 15 ft. water on it at the mean level of the river, and at times not more than 12 ft., which obliges vessels of moderate draught to anchor at 6 or 7 miles from the town in 17 ft. water, with the Residencia in the southern part of the city bearing S.W. by W.

The domes of the churches and the vessels at anchor in the outer road are seen at a distance of 10 or 11 miles. The bottom on the City Bank or that southward of the outer road being hard, it is necessary to keep a little to the northward. Having passed the bar, the soundings slowly increase, and the bottom becomes softer; when in 17 ft. water, soft mud, steer to the westward, and anchor in about 20 ft., with the guard-ship bearing S.E. by E., distant 2½ miles; the custom-house, S.W. ½ S.; and the church of La Recoleta, N.W. of the town, S.W. by W. ½ W. A good berth will also be found near the sunken vessels, where the water is deepest and the position convenient for boats. It is not usual to moor in the outer roads, but to veer a long scope of cable, and be ready to drop a second anchor with south-easterly winds.

INNER ROAD.—The inner or little road off the N.E. angle of the city is a space of about 1½ mile in length, in a N.W. and S.E. direction, and about 3 cables in breadth, having 12 and 13 ft. water. It is formed between the City Bank and the coast; the latter is bordered with a bank of rotten stone. To the northward of the inner road is the anchorage El Pozo, having about a foot more water. Vessels in the Pozo and inner road always moor N.E. and S.W., and great attention should be given to prevent grounding on the anchors, for frequently there is only 8 or 10 ft. water, and vessels are often aground and unable to go to sea for 15 or 20 days. There is always a large number of vessels here.

In proceeding from the outer road to this anchorage, steer N.W. by W. until the church of Recoleta bears S. by W. ½ W., then steer on this line across the West part of the City Bank over soft bottom, in from 10 to 13 ft. water at the mean level of the river, until 1½ mile from the shore; when a course about S.E. by S. will lead to the anchorage. The depths of water over this part of the bank are about the same as elsewhere, but this track, though 4 miles longer than the direct track, is chosen on account of the soft nature of the bottom.

The *Catalina Channel*, south-eastward of the above, is a depression in the City Bank, but the bottom is harder; it is much used by vessels under 10 ft. draught. The leading mark through is a white house near Palermo Chico, a large white house with an arched piazza, in one with the umbrella tree, bearing W.S.W. But as the banks are constantly shifting, and the marks are indistinct, it is necessary, when going into the inner road, to employ a pilot, and particularly for the purpose of choosing a clear berth, and avoiding the many lost anchors in the roads.

Tides.—It is high water at Buenos Ayres, on full and change, at about 12^h; and the rise may be from 3 to 5 ft. The flood runs 5 hours, and the ebb 7 hours, at from 1 to 2 miles an hour. In fine weather the tides are generally regular, but with a fresh breeze they are in a measure irregular. The winds from the S.E. cause the water to rise, and those from the N.W. depress it, and in some places cause a difference of 12 ft. A case has occurred when the wind from the N.W. has so depressed the water, that a person was able to walk dry to the vessels anchored in the inner road.

Rio Riachuelo.—At about a mile S.E. of the town is the little river Riachuelo, with 13 to 16 ft. at low tides, over soft mud, which serves as a port of commerce to Buenos Ayres. This river being the deepest on the South coast was the cause of the town being placed on the neighbouring plain. Its mouth is obstructed by banks, so that vessels drawing less than 10 ft. alone can enter when the water is high from the S.E. winds, there being 3 ft. only on the bar at low tides. Large numbers of coasters here load and unload. On its right bank are saladeros, from which the wool, hides, tallow, beef, &c., are shipped. Small craft are here hauled up for repairs. The great inconvenience of the Riachuelo is the putrid state of the waters in summer, the refuse from the saladeros causing a most overpowering stench. If the bar were deepened the place would admit vessels of all sizes; and in 1876 a scheme was commenced for facilitating the entrance into it for small vessels. The *Barracas*, a small village, lies 2 miles up the Riachuelo, and from this there are two roads to the city. The people are occupied in the saladeros and produce warehouses, and it is connected with the city by the Boca and by the southern railways.

BANKS IN THE RIVER.—It is necessary to bear in mind that great changes are constantly taking place in the form and positions of the banks, caused by the continued deposit of sand brought down by the Paraña and the Uruguay. It is therefore necessary not to trust entirely to the charts or directions in a vessel of more than 16 ft. draught, and it will always be prudent to have the aid of a pilot.

The greatest part of the sand brought down by the rivers is deposited on the Palmas and Ortiz Banks; another part carried through the channel stops on the Santiago, Chico, Cuirassier, and other banks, which are continually increasing. The two principal channels along the shores of this estuary are being obstructed slower than other parts of the river; their beds are formed of layers of soft mud, which indicates their course, and is the best guide for a vessel when the land is not seen; thus the bottom is more or less soft in the channel, and more or less hard on the banks.

Soundings.—Between the parallels of 34° 30′ and 36° 0′ S. the lines of soundings follow a direction nearly parallel to the coast, or N.E. and S.W., and decrease regularly at right angles towards the land. The depth increases to the southward and to the eastward, and decreases to the northward and to the westward. At 60 or 75 miles beyond the mouth of the La Plata the waters lose their blue tint and assume a yellowish-green colour.

On the parallel of 34° 0′ S., at 75 to 90 miles from the land, there is 67 fathoms water; at 50 miles from the land there is only 22 fathoms, mud, sand, and shells; from the latter distance the depths diminish rapidly towards the land. In the latitude of the Castillos, 34° 25′, at the distance of 90 miles, there is from 55 to 57 fathoms water, black mud; and continuing westward on that parallel, sandy bottom, which is on the whole coast, will soon be found; within 40 miles of the land there is only 20 to 22 fathoms. Small red or pink broken shells have been found in the vicinity of Cape Castillo.

In the latitude of Lobos and on the meridian of 52° 25′ there is 93 to 99 fathoms, muddy sand; to the North the depth decreases. On the parallel of Cape Sta. Maria, and on the above meridian, there is only 58 to 63 fathoms, and in running South on the same meridian the bank bordering the coast will soon be lost.

Between the parallel of 35° 30′ and that of Cape San Antonio, the bottom is sand, mixed with shells and gravel.

La Plata Bank.—At the entrance to the Rio de la Plata, between the meridians of Maldonado and Cape Castillo, is a remarkable bank, with an average depth on it of from 11 to 14 fathoms, fine sand and broken shells. It extends N.E. and S.W., as if formed by the currents, parallel to the coast, at a mean distance of 42 to 46 miles, having but little breadth, and reduced in places to a few hundred yards.

ENGLISH BANK, a dangerous rocky shoal, partly covered with sand, and dry in several places at low water, on which the sea continually breaks over a space of from 3 to 4 miles, lies N.N.W. and S.S.E., 12 miles in length, and 7½ miles in extreme breadth. From its North end Flores Islet lighthouse bears N. by W., distant 11 miles, and Monte Video lighthouse N.W. by W. ½ W., 22½ miles. The soundings eastward of the bank are very irregular, and at the distance of from 8 to 14 miles are several shoal patches of from 4½ to 6 fathoms water, apparently forming another bank of about 18 miles in length, North and South, with depths of 8 fathoms between it and the English Bank. The bottom on this shoal ground is mud and sand, whilst that eastward of it is sand and broken shells.

There is 6 and 7 fathoms water close to the North end of the English Bank, but a vessel southward of this parallel will pass over the shoal water eastward of it, and if common precaution be taken with the lead, the approach towards the bank will be indicated. To the northward of the bank the depth will not be less than 7 fathoms until westward of its meridian. Should a vessel have occasion to anchor near it, the anchor should not remain long in the ground, as from the stiff nature of the bottom there will be great difficulty in lifting it.

A *bell buoy*, painted *red*, 4½ ft. high, has been placed on the East side of the English Bank in 28 ft. water, sandy bottom, about 2 miles from the nearest part of the bank, and is visible from a distance of 3 miles. The buoy lies in lat. 35° 13½′ S., long. 55° 47½′ W., and 10 miles S.E. ½ S. from the English Bank lightvessel. Mariners should not trust to the buoy as it often breaks adrift.

The English Bank Lightvessel is off the North end, and is painted *red*, having three masts, and exhibits a *fixed bright* light, visible 6 to 8 miles; but the light should not be too much depended upon. The vessel lies in 7 fathoms water, muddy bottom, at 4 miles N. by E. of the North point of the breakers, and about 2½ miles N.N.E. from the nearest part of the shoal. In

1879 this vessel was reported to be moored in 7 fathoms, about 1¼ mile E. ½ N. from the North point of the bank.

Lighthouse.—An iron lighthouse was commenced to be built on the North end of the English Bank, at about 11 miles southward of Flores Islet lighthouse, but the works were swept away in a gale on September 12th 1881. It was proposed to exhibit from it a *fixed bright* light, elevated 102 ft., and visible 15 miles.

Archimedes Bank, discovered by an English frigate of that name, is westward of English Bank, and extends over a space of about 6 miles, having on its centre 2¾ fathoms water, near its South end only 1¼ fathom, and on other parts of the bank from 3¼ to 4½ fathoms. The bank is composed of sand, whilst to the northward and westward the bottom is mud, or sand and mud. It should not be approached, unless in a vessel of very light draught, nearer than 5 fathoms water. Between the Archimedes and the English Bank there is a channel nearly 4 miles wide, with 5¼ and 5½ fathoms in it, sand and mud,

BANKS SOUTH OF THE ENGLISH BANK.—There are several sandbanks southward of the English Bank, but their extent and positions are not yet well ascertained. *Meduse Bank*, with 3 fathoms water on it, is nearly on the meridian of Monte Video, and in the parallel of 35° 24½′ S. *Narcisse Bank* and several other patches, with 3½ fathoms on them, lie to the southwestward and the S.E. of the Meduse, between the parallels of 35° 28′ and 35° 35′. *French Bank*, with 1½ fathom on it, occupies a place on the chart in lat. 35° 43′, long. 55° 37′ W. This shoal was reported by the Spanish Captain Famadas in 1803, and Oyarvide was sent and searched for it for two days, at the place indicated, without success. A depth of 5½ fathoms was found a little southward of its assigned position, and also a bank at 17 miles W. by S. of the same place.

Aizpurua reported the existence of a shoal in lat. 35° 50′ S., long. 55° 20′ W. In December, 1835, the brig *Véloce* grounded on a sand-bank with 13 ft. on it in about the same latitude.

Rouen Bank, with 17 ft. water on it, was found by Captain Frement, of the *Ville de Rouen*, in lat. 35° 45′, long. 55° 59½′. From the eddy and colour of the water it was thought that a less depth may be on it; the East end of *Astrolabe Bank*, which extends eastward from it, is in lat. 35° 44½′, long. 55° 44′. Between the two positions there is 4½ and 5½ fathoms, hard bottom. The pilots of Buenos Ayres say the Astrolabe changes its position, but this does not agree with the nature of the bottom.

The Cuirassier, or Banco Nuevo, on which the French brig of the former name grounded, is about 3½ miles long N.W. and S.E. and has 16 to 18 ft. water on it, bottom sand and mud. Its N.W. end is N. by E. ½ E., distant 11½ miles from Indio Point; and its S.E. point N.E. by N., 10¾ miles from the same point. Between this bank and the Ortiz there is a channel 3 miles in breadth, and about 4 miles in length, having 3½ to 3¾ fathoms water, mud, and mud and sand. To the southward of the Cuirassier, between it and the bank bordering the coast of Buenos Ayres, the depths are 3¼ to 3¾ fathoms, with the same bottom.

At a quarter of a mile distant from the S.E. end of Cuirassier Bank, lies the *Indio Point Lightvessel*, before described.

ORTIZ BANK begins near Colonia, borders the coast eastward so far as the outlet of the Rivers Pavon and Pereyra, a distance of about 37 miles, and extends in a tongue to the south-eastward across the La Plata, the shoal parts terminating 14 miles N.E. by N. from Indio Point. It may be about 57 miles in length, and was formerly thought to have an average breadth of 15 miles, but the south-eastern portion, which was examined in 1871, appeared to have an average breadth of only 3 miles, and to have extended in a S.E. direction towards Piedras Point; the least water on the bank is 9 ft., hard sand, about 16 miles N.N.E. from the hill near Indio Point. In the centre the depths vary from 8 to 15 ft.; and along its North part, at 4 miles from the shore, the bottom is remarkably level, the depths being from 2 to 2½ fathoms.

The bottom is sand, or rocks covered with sand, which the seaman should take into consideration in crossing with a vessel of light draught, as well as the state of the river. The bank may be approached on all sides by the lead, the soundings gradually decrease, and the mud becomes mixed with sand; the only fear is getting in one of the indentations of the bank more or less deep, and known by the pilots under the name of *saccos*. A vessel should not go nearer than 3 fathoms water.

The Ortiz Bank forms two channels, one along the North coast, which is long, narrow, and practicable only for vessels of about 12 ft. draught. The other on the South, northward of the Chico Bank, is deep, and more frequented, being the main channel between Monte Video and Buenos Ayres.

Chico Bank, in the middle of the channel between the Ortiz Bank and the coast of Buenos Ayres, is about 13½ miles long in a N.W. and S.E. direction, the depths upon which vary from 6 to 10 ft., with narrow channels of 17, 19, and 20 ft. between; these banks are steep-to on the north-eastern side. From the northern extremity of Chico Bank, Magdalena church bears S. by E. ½ E., 16 miles, and from the shoalest spot of 6 ft. the same object bears S. ¾ W., 9½ miles.

Between Chico Bank and the coast of Buenos Ayres there is a channel of about 4 miles in breadth, navigable for vessels under 15 ft. draught, by steering along the coast, but it is not recommended, as the currents run strong, and the nature of the bottom changing with the depth, the soundings are not a sufficient guide. The channel between the Chico and Ortiz Banks has from 4 to 6 fathoms water.

Chico Bank Lightvessel, painted red, with two masts, is moored in 4½ fathoms water, 1½ mile off the North end of the Chico Bank, and 17 miles N. ½ W. from Magdalena church; the vessel exhibits a *fixed bright* light, elevated 20 ft., and visible 10 miles. The vessel's position is often doubtful after gales. In April, 1873, she sank, and is replaced by a small schooner without a name.

In the vicinity of the Cuirassier and Chico lightvessels, in ordinary weather, the average rise and fall is 4 ft., the ebb setting to the S.E. at the rate of 1½ mile an hour, and the flood to the N.W. at 1 mile an hour.

The Coast Bank, from Cape St. Antonio to Buenos Ayres, extends along the whole shore, at a distance of about 3 to 12 miles. In the great bay of San Boronbon it is soft mud to near the vicinity of Piedras Point, where it is hard mud and tosca; from Magdalena to Buenos Ayres it is sand, or sand and mud mixed.

Santiago Bank.—To the northward of Santiago Point is the bank of the same name, having 1½ fathom water on it, with its outer edge 6 miles from the shore. It is steep-to, and should not be approached nearer than 3½ fathoms. The channel into Barragan Bay is along the coast from the eastward, or if from the westward of the shoal, between it and that extending from Lara Point.

The centre of *Lara Bank*, of 12 ft., about 2 miles long, lies about 1 mile N.W. by N. from Lara Point. To the westward of Lara Point is the S.E. extremity of the bank stretching from the front of the town of Buenos Ayres; the first part is called the bank of Quilmes, and the latter the Ciudad or City Bank; it is composed of sand, or sand and mud. The outer road of Buenos Ayres is formed between this bank and the Palmas Flats.

GENERAL DIRECTIONS.—Making the land at the entrance of the Rio de la Plata does not present any great difficulty. The inconvenience is caused by the frequency and suddenness in the changes of the weather. The latitude is of the greatest importance, and no opportunity should be lost in obtaining it either by day or night, whenever the state of the weather will admit; and, with the lead, the vessel may be navigated with safety. The best parallel for entering the river is that of Lobos Islet. On this parallel, in long. 52° 25′ W., in about 90 to 98 fathoms water, steer westward, so as to pass 30 miles southward of Cape Santa Maria, where there is 18 to 20 fathoms water.

Before reaching the meridian of the cape, a vessel will pass over the northern part of the La Plata Bank in 11 to 14 fathoms water. Allowance must be made for the current according to the direction and force of the wind, bearing in mind that with the wind from S.E. it sets strong towards the coast. If set to the southward the depths will increase slowly, the bottom being fine sand; if, on the contrary, the vessel be set to the northward, the soundings will decrease rapidly, and the bottom is sand and broken shells. The nature of the bottom and the change of depth will assist in indicating the course followed, and as a vessel proceeds westward the chart is the best guide; but mud and sand will be found on the parallel of Lobos; and muddy bottom is sure indication of being in the fairway.

Several vessels are yearly wrecked on the English Bank by not paying attention to the lead, and particularly to the nature of the bottom. To the westward of Lobos Islet, with a scant or beating wind, the North shore should be kept aboard, as it is bold; there are no outlying dangers at the distance of 5 miles from it, and the weather is seldom so thick for any length of time that the land cannot be seen. The nature of the bottom is mud, and the decrease of soundings to the westward will indicate an approach to Flores lighthouse. With a fair wind, if a vessel be to the southward, out of the channel, the bottom will be sand, especially near the English Bank, whilst in the channel the bottom is pure, soft, blue mud.

With a steady N.E. breeze, Cape Castillo should be sighted, when the vessel, aided by a favourable current, can run along the land. If, however, the wind be from South to S.E., or the weather be uncertain, by sighting the cape a vessel will be to leeward, with a strong current against her, and a heavy swell setting towards the coast. It would therefore be necessary, with a South or S.E. wind, to keep a little southward of the parallel of Lobos, and steer so as to sight that islet in a West or N.W. direction. Cape Santa Maria is low, and difficult to be seen, but the lighthouse will make it easily distinguishable.

Attention should be paid to the soundings over the La Plata Bank, and the river should not be entered before a vessel's position is well ascertained by sighting Lobos or the surrounding lands, which in fine weather will be seen at a distance of from 15 to 25 miles. As Cape San Antonio, the South point of entrance, is low, and seen only at the distance of a few miles, a vessel from the southward, in the absence of observations, must depend entirely on the lead; and in proceeding for Buenos Ayres, the Cuirassier lightvessel near Indio Point will probably be the first thing seen, at a distance of 6 or 8 miles. From the vessel a pilot may be obtained.

If caught in the river with a S.E. gale, and unable to reach a port, it will be prudent to anchor on muddy bottom, under the lee of any sand-bank. If eastward of Lobos Isle, the vessel will be set rapidly towards Cape Castillo, where shelter will be found on the North side of the cape, or she may stand off shore until the return of fine weather.

In entering the Rio de la Plata southward of the English Bank the seaman should be certain of his latitude, and steer on the parallel of about 35° 36′ northward of the Rouen Bank, taking into consideration the state of the wind and sea; or run on the parallel of 35° 56′ South of the Rouen, but carefully avoiding the parallel of 35° 45′. Being in 9 or 10 fathoms water, continue westward in regular soundings until in 6 fathoms muddy bottom; then steer N. ½ E. until Monte Video is seen, keeping in muddy bottom. Should the wind be from South round by West to N.W., neither the English nor Archimedes Banks should be approached very closely.

The bottom northward of the parallel of 35° 30′ and eastward of the meridian of Monte Video, is sand sometimes mixed with shells; whilst westward it is mud, with the exception of the tosca off Piedras Point, and the Ortiz Bank, which is sand.

During a recent examination of the approaches to the Rio de la Plata, by the U.S. ship *Essex*, Commander W. S. Schley, it was found that a very marked depression of the ocean bed exists between La Plata Bank and the coast of Uruguay, and notably a channel or mud-well, the bottom of which is mud, of the consistency of sticky clay, and varying in colour in different parts from that of lead to a bluish black.

This channel commences South of Maldonado light, distant about 1 mile from the coast, and is at this point 11 miles wide. It maintains this width, excepting at one or two points near Cape Santa Maria, outward to Cape Castillo, where its distance from the coast increases to about 25 miles. Its general direction is about N.E. by E.

Having crossed the mud-well, and steering towards the coast, the following changes in the character of the bottom will be observed: first, *mud* and *sandy grit*, next *mud* and *shell*, and finally *sand* and *shell;* the *sand* becoming quite coarse, changes *colour*, and is mixed with *gravel* or *pebble* and *coloured shells* as the coast is neared, while the soundings decrease somewhat regularly in depth to 14 and 12 fathoms about 4 miles from shore. In thick weather, or when all points on the coast are not plainly visible from that distance, the water should not be shoaled to less than 15 fathoms. Going seaward, and having crossed the mud-well, the character of the bottom is as follows: first, *mud* and *sandy grit*, then *mud* and *shell*, next *fine* gray or *white sand* mixed with *broken shells*, and beyond the La Plata Bank, fine white and gray sand.

Vessels bound for La Plata River, after having passed the latitude of Cape Castillo will find the mud-well an excellent check on the reckoning when approaching the coast.

Pilots.—The cruising ground of the pilots is usually off Cape Santa Maria, about 10 or 15 miles from the lighthouse. In bad weather they rarely keep their station, as their cutters are small. They carry a large blue flag at the masthead.

MONTE VIDEO to BUENOS AYRES.—It is customary for vessels from Monte Video to Buenos Ayres to employ a pilot; and unless the mariner has some knowledge of the navigation of the river, it is almost indispensably necessary for those of more than 16 ft. draught; for although the channel is marked by Cuirassier and Chico lightvessels,* at certain places it is narrow, and the edges of the bank are liable to change after gales or extraordinary tides. The pilots alone can be acquainted with these periodical changes, but they should not be trusted too much, though their services are still at a high price; those only known to the place should be employed.† As the banks are generally steep-to, the least neglect in the steerage may cause a vessel to ground; great attention should therefore be given to the navigation even with a pilot on board.

Vessels of less than 9 ft. draught can almost always steer across the Ortiz Bank in a direct line. In proceeding through either channel it must be borne in mind that when in the fairway the bottom will be soft mud, and the nearer the banks are approached the more the mud will be found mixed with sand, and the bottom harder, as near all the banks sand predominates. Should a vessel's position be doubtful in consequence of thick or bad weather, she should anchor. To the eastward of the meridian of Flores a vessel should anchor only during fine weather, but westward of that meridian she may anchor without the least inconvenience anywhere when the bottom is mud. Almost everywhere near the banks in the Rio de la Plata, the upper stratum is a mixture of black mud and sand, whilst the second, which is reached by the anchors, is stiff clayey mud.

SOUTH CHANNEL.—In leaving Monte Video for the South Channel to Buenos Ayres, steer about S.W. by W. ½ W. so as to pass about 3 or 4 miles to the S.E. of Cuirassier lightvessel; but as the currents which always prevail in this part of the river are uncertain, the course should be carefully preserved by the bearing of the Cerro as long as it is in sight, which in fine weather will be at a distance of 28 or 30 miles, and which should be carefully measured. Although this part of the bed of the river is nearly flat, great attention must be paid to the lead.

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* The mariner is warned that these vessels, after a heavy pampero, are often out of their proper positions, sometimes to the extent of 3 or 4 miles. In April, 1873, the Chico lightvessel sank. The lights of vessels at anchor must not be mistaken for those of the lightvessels, although this is frequently said to occur.

† Some care is required in selecting pilots, for although licensed by the superintendent of the port of Buenos Ayres, it is to be feared there are many who are not competent to undertake the navigation of the river. Wrecks are frequent, but the pilots are seldom, or never, made to feel their responsibility.—*Lieut. L. S. Dawson, R.N.*

Should the soundings decrease to 3 fathoms before the necessary distance is made good, a vessel will be near the southern shoal patch of the Ortiz Bank; but should they increase to 4½ fathoms or more, she will be some distance to the south-eastward, bearing in mind that generally the bottom is more or less soft in the channels, and more or less hard near the banks. The mariner must not be deceived in his distance from the land, as it may be seen at about 12 miles off, and in a few hours not 5 miles. In thick weather it will be prudent to anchor.

Having passed within half a mile on the East side of the Cuirassier lightvessel, steer N.W. ½ W. about 28 or 30 miles, making due allowance for the current; the ebb sets S.E., and the flood to N.W. When the Chico lightvessel is seen, which it probably will be after having run 18 or 20 miles, steer so as to pass northward of her, then about a W. ¾ N. course made good will lead to the guard-ship, and over the flats to the outer road of Buenos Ayres. Should the Chico lightvessel not be seen, in consequence of thick weather, or being out of her proper position, skirt the edge of the Ortiz Bank by the lead.

Towards the Ortiz Bank the depths shoal very gradually; Chico Bank is steep-to. It is scarcely known of a vessel grounding on this edge of the Ortiz Bank, but several have grounded on that of the Chico. From the Chico lightvessel the soundings westward are regular as far as Santiago Bank, when they gradually decrease to Buenos Ayres.

From the Cuirassier or Indio Point lightvessel to Buenos Ayres, the navigation for a sailing vessel presents some difficulties, unless with a fair wind, and at all times requires great attention. Between the two points, in ascending or descending the river, the seaman should not attempt to beat against the current unless the vessel can attain a speed of 6 knots; if the current is beyond its normal state of 1 or 1½ mile an hour, it will be more prudent to remain at anchor. In working to windward, keep the Cuirassier lightvessel as near as possible on a S.E. bearing as long as she is in sight, and then do not stand nearer than 3½ fathoms on either side.

When in the vicinity of the Chico Bank, the trees and church of Magdalena may generally be seen; they should not be brought to bear southward of S.W. by S. until on the North side of the channel. The Ortiz Bank should now be kept aboard. When Magdalena church bears S.S.W., a vessel will be between the Ortiz and Chico Banks; it can be seen from aloft in the middle of the channel in clear weather, but will be lost sight of in 3 fathoms near the Ortiz Bank.

The Chico Bank is one of the most dangerous in the La Plata; a vessel should approach it with the greatest caution, not too close, and the lead should be hove quickly. To the westward of the Chico, a vessel will have no difficulty in tacking on either side of the channel at a prudent distance from the edge of the banks, bearing in mind that Santiago Bank is steep-to. If bound to Colonia or the Hornos Islands, steer by the lead along the edge of the Ortiz Bank until the islets at the entrance to Colonia are seen; then steer eastward or westward of the Farallon, according to circumstances.

Vessels leaving Buenos Ayres for the south-eastward should steer in mid-channel for the lightvessel on the North end of the Chico Bank, preserving the course by the bearing of the guard-ship as long as she is in sight; and the bearing of Barragan trees will indicate an approach to the bank. Should the Chico lightvessel not be seen, on account of fog or other cause, the edge of the Ortiz Bank should be skirted by the lead; and, when sure of being eastward of the Chico Bank, steer for Cuirassier lightvessel, making due allowance for the tide, and keeping the lead going.

WINDS.—At Buenos Ayres, between August and March, the winds are from the eastward. About noon, if the barometer is in a mean state, it is generally calm or little wind, which freshens from the south-eastward towards sunset, when it blows fresh, veers to the northward during the night, and becomes calm again about noon. In April, May, June, and July, the weather is variable. The barometer always rises with a S.E. wind, which brings clear dry weather; falls for a pampero or S.W. wind, but falls lowest with the wind from North to West, which brings cloudy rainy weather. It may be fine weather at sunset, and two hours after blowing a gale, but the barometer is sure to indicate it.

The following remarks on the peculiar winds encountered in the Rio de la Plata will be found useful. They are quoted in a very useful work, "The Handbook of the River Plate, &c.," by M. G. and E. T. Mulhall, Buenos Ayres, vol. ii., pp. 141—146:—

Pamperos.—In the River Plate this is the name for the strong winds which come from West to S.S.W., and so called from their coming over the great plains called Pampas. They may be classified into two categories—local pamperos and general pamperos. The first is of short duration, and even when it blows strong the sky is clear. The general pampero, on the contrary, comes in squalls and gusts. They have their origin in the Andes mountains, and are the great storms of these latitudes. These are the pamperos proper, called *sucio*(dirty) in the country, and generally lasting three days. In the first hours, particularly after noon, the pampero is most tempestuous, accompanied by rain and thunder; but when the sky clears, a fresh breeze follows, with fine weather. When the pamperos come in force they last sometimes for fifteen or twenty days, and vessels lying in for the river are much knocked about by the heavy sea which they raise. When the wind shifts to the South or S.E. and East in general it becomes clear then, and good weather is established. But though the pampero is stormy and to be dreaded, it is not so terrible or dangerous as the S.E. gales. If a vessel caught by such a gale is obliged to enter the river, there is no other resource than the anchors, close to a bank, if possible, but even close on shore there is no alternative. As the S.E. gales always bring rainy cloudy weather with them, it is difficult for the navigator to make his port. If a vessel is thus caught outside the river, and not very far, she is in danger of being driven on the coast of Castillos. Thus it is a S.E. gale is more to be feared than a pampero, and experience shows that the wrecks are nearly always caused by winds from the second quarter.

Coming from Europe these winds are not generally met with until lat. 30° or 32° S. is reached. If the wind freshens during the day from North or N.W., and continues so after mid-day, there is certain change of weather; the change will be a pampero if the wind veers to the fourth quarter, and a mist rises, with lightning in the South or S.S.W. It is time then to take in sails, and prepare for the squall. The approach of these storms is also indicated by very fine webs entangling in the shrouds of a ship, by the prevalence of insects brought by the hot winds, by the rise or fall of the river, and the suffocating heaviness of the previous northerly winds. The barometer shows it by a great fall.

The sudden coming on of a pampero in summer is during clear weather and a fresh breeze, when vivid lightning appears in the S.W. If it is daytime, and the squall may be seen coming, or if the wind suddenly shifts to the N.W. or West, and thence to S.W., no time should be lost in making everything ready. A pampero may always come after a calm day and hot weather, and at times follows after strong N.E. winds, when the sky is overclouded.

If, after a pampero has set in, the wind is strong from the second quarter, and it continues to rain, it indicates a lengthened duration. The weather will not settle without many squalls from the S.W., which will lighten the atmosphere. If, after the rising or setting of the sun, there is a lull in the wind, it denotes a subsidence or change, and though it may blow strong afterwards it will not last long. When a pampero is about to cease, the wind veers to the West, and the atmosphere clears up; the land breeze will take its place if it be morning; if evening, then the N.E. or S.E. sea breeze. In summer, pamperos are but of short duration, but in winter they sometimes last long; occasionally they pass round to the S.E., and then render the coasts obscure. During the night it does not blow so strongly. These pamperos cleanse the atmosphere, as the N.W. winds in the meridian of Spain, and generally there is a clear sky while they last.

Turbonada or Squalls.—Such is the summer pampero called, and at times it bursts with terrific violence, though, happily but of short duration. If a ship is under sail when indications of such a squall is seen, it may be prudent not only to have the smallest possible canvas on, but also to dip the upper yards without a moment's delay. "In 1828," says Capt. FitzRoy, "we came very near to being dismasted and capsized during a pampero, although the sails were all lowered or close-reefed: it is therefore wise to take immediate precautions when the indications appear. It may be that such a squall as we then experienced may not again be felt for thirty years. Twenty pamperos out of thirty are not dangerous, and some are only ordinary storms of short duration, and whose advent need not be feared. Years may pass without any very terrible pamperos occurring. From 1828 to 1833 there were none of very great violence, but in the latter year we had three of very great force." Nearly always when a pampero is about to cease, the wind subsides or veers to the southward. Sometimes these storms extend out to sea, even beyond the latitude of Santa Catalina. If they come with clear weather, they last longer than when the sky is overcast. But in the Plate, and outside its entrance, the winds are very variable.

The Summer Season.—During the fine season, which is from September to March, N.E. winds are prevalent; the atmosphere is hazy, and the sky covered with clouds of undefinable formations. As the river is approached, the winds will be found to go round to the East, and at times blowing fresh from the S.E., with rain and dark weather. Inside the estuary, in good weather, the wind generally will be found to pass round the compass in twenty-four hours.

A gallant-sail breeze blows from the S.E. in the evening, replaced by a similar one from the N.E. at night, followed next day by a light wind from the westward or a calm, gradually going round to the South.

Virazon, or Sea Breeze.—This is the name for the breeze which has just been mentioned. When it is not prevalent, or baffled by winds from North and N.W., a "turbonada" from the S.W., more or less strong, must be expected before the sea breezes are settled. If it is hazy from sunrise until 8 or 9 o'clock in the morning, the "Virazon" is pretty sure to follow. When the weather is settled, the wind in the morning is generally North or N.N.W., moderate breezes, until 10 or 11 o'clock in the morning. Then commences a fresh breeze from outside, from E.S.E. to E.N.E., gradually lessening after sunset, until near midnight, when it generally becomes a calm. From midnight until dawn it goes round again to North and N.E., and again traverses the same course during the day. Thus, in general, land breezes are prevalent at nights, and sea breezes during the day, until the equilibrium of the atmosphere is upset. The Spanish pilot, Don Claudio Vila, thus describes the weather of the River Plate: "Good weather generally lasts fifteen or twenty days. In the mornings northerly winds blow strong and warm, increasing with the day, and at noon the sky is overcast and hazy. Soon after, a squall appears forming in the fourth quarter, with another in the South, both sending forth vivid lightning. Ordinarily the changes extend over two days, during which more or less rain falls, the atmosphere is charged, and heavy black clouds are driven to and fro by the winds prevailing. After this and a heavy thunderstorm, the sky is clear as a bell all over the third quarter, when a pampero begins to blow, but which only lasts for the day, the wind passing rapidly to the second quarter and serene weather." Sometimes during ordinary weather, instead of a clouded sky, there is rain and fresh winds; but it is not easy to foretell from whence the clouds or wind will come. If from the North, bad weather is likely to follow; and if the wind does not go round to the South, even when it looks clear, the good weather will not then be of much longer duration. The more overcast becomes the sky, and the more it rains and blows from the North, the stronger it must blow from the South to clear the heavens. During the warm months of summer, when it does not rain much to refresh the earth and atmosphere, the northerly wind is suffocating for man and animal, and the inhabitants attribute baneful influences to it. While it lasts the barometer is low, and continues to fall as it freshens, which may be for three days; the atmosphere is charged with electricity, and it ends nearly always with a gale, when the wind veers to S.W., and the equilibrium is renewed. Near the full and new moon there is generally a breeze from the S.E., with some rain; at other times the wind continues from the North, but not so strong as that from the S.E., and with a high temperature. The pilots of the Plate say that S.E. winds will prevail if the declination of the moon is southward, and North winds if the dip of the moon be northward; in the latter case, North winds will nearly always go round to N.E., if it be dry weather; but if there be rain or dew, then it is inclined to be N.W. At times it freshens up strong, accompanied with squalls, and runs round to S.W., clear weather. This wind brings a high sea, followed soon by a calm.

The Summer Season in Buenos Ayres.—According to the observations of M. Thoyon, of the French navy, the winds are lightest in these parts from

December to March, and also more regular than during the other months of the year. It is usual for the breeze to pass in the evening to the N.E., North, and even N.N.W., blowing strong from the latter point in the morning, but eventually running to North or N.N.E., and subsiding into a calm about 11 o'clock; in the afternoon it revives from the East or E.S.E. until dark, when it returns again to North. The pamperos, or S.W. winds, are very rare during these times. In summer, as in winter, N.W. winds are warm, rainy, and disagreeable; whilst the South winds, after their first stormy advent, bring bracing weather and a clear atmosphere. Easterly winds are cold and wet, except the sea breezes in summer. Westerly winds give dry days and agreeable weather. Summer is the worst time to be in the Roads of Buenos Ayres, because the S.E. winds are generally fresh during the day, and cause an awkward sea, rendering harbour work and communication with the shore rather difficult.

Winter Season.—The prevalent winds at the mouth of the Plate from March to September are West and S.W., but inside they are generally from the fourth quarter. At this season, when the weather is very good, the wind goes round with the sun as in summer; but this only happens perhaps once in a fortnight. In general the wind is from South to East, or from North to West, blowing more or less strong successively from these quarters. North winds bring rain, thunder, and lightning, South winds hail, and those from the East heavy rains. If the wind follows round with the sun, the weather is settled; but if it shifts inversely, then bad weather and strong winds may be expected. Pilot Vila says: "In winter, if the wind comes from N.E., increasing, and remaining fixed for one or two days, with thick weather, it is dangerous then to navigate the river without experience, especially as the islands and coasts at the entrance cannot be made out, whilst the current is setting in strong. After venting its strength from the second quarter, the wind passes to the first, without ceasing to rain; it remains there for a day or two, settling in the North on the fourth. At the time when it enters this quarter there will appear a black horizon from the S.E. to W.N.W., then a clear space appears, and a strong pampero will begin to blow on the instant, clearing the sky before it. This wind continues from S.W. to W.S.W. for five or six days, clear weather and light clouds, and at the same time the current from the river begins to set out strongly. The pampero will be followed by winds from the second quarter, which brings on rain again; before long it shifts to the first quarter, and then to the fourth, to be followed again by a furious pampero, but which will not last long, and brings settled weather." Although South winds are more frequent and of longer duration in winter than in summer, and though North winds generally prevail in summer, yet, at times, they occur from the opposite directions. During winter, South winds are persistent storms, whilst in summer they are shorter, though often strong and violent.

Winter Season in Buenos Ayres.—In these roads winter is preferable to summer, because the common winds are S.W. to N.W., which leaves a smooth river and easy communication. M. Thoyon made the following observations on this season:—"The pamperos are more frequent from June to October, otherwise there are fresh and variable breezes, with many days of calm, rain intervening between these changes. A strong breeze from the East is almost sure to be followed by a stronger one from the West, and *vice versâ*, whilst the weather will not settle until the wind remains in either North or South, according to where it commenced. Thus, a breeze that springs from the West passes to S.E., freshening up when it reaches East or N.E., will leap to the N.W. with a squall, returning again to West; but the weather will not be good until the breeze springs up again from North." It may be remarked as traditional among the inhabitants of the Plate, that about Santa Rosa's holiday, which is at the latter end of August, there is always a storm; the hurricane of that period in 1860 was terrific, and twenty vessels were lost in the roads of Buenos Ayres and Monte Video.

CURRENTS and TIDES.—The general movements of the waters in the La Plata are greatly influenced by the direction and force of the wind. With fine weather and light breezes there is some degree of regularity in the tides. The mouth of the estuary being wide and shallow, the water flows easily in when the wind is from seaward, and is forced rapidly out when the wind is off the land. The variations of the winds have such an influence on the movements of the waters, that there is nearly always a possibility of foreseeing the alterations in the weather, from a daily observation of the current and height of the water.

Before the winds from the S.E. and seaward are felt on the coast, the level of the river begins to rise at the shore of Buenos Ayres. For several hours, and sometimes for a whole day before a pampero, the water is seen rising in the port of Monte Video. When the current runs to the westward along the North coast of the La Plata, a N.E. wind may be expected.

Before stormy weather, or gales from S.W. or S.E., the current sets into the river, and the water rises to a height in proportion to the duration of the bad weather. At times the difference between high and low river is as much as 20 ft. The winds between N.N.E. and W.N.W. cause the river to fall the lowest; the down current is then stronger along the South coast, but it seldom exceeds 3 miles an hour; on the North bank it is inconsiderable. The pamperos cause a rapid flow of water in the port of Monte Video, but it does not last more than 3 or 4 hours from the beginning of the gale, and is followed quickly afterwards by a strong ebb, which causes the vessels to swing broadside to the wind and sea, and especially along the wharves of the town.

When the wind is from N.E. for some time, the waters flow to the westward along the North coast, whilst they are falling and running to the eastward along the South coast; and during the time the wind remains between S.E. and N.E., the current flows generally to the westward, beyond Monte Video, without much increasing the depth to that point, while it fills up the river above the banks. With the winds from N.N.E. to W.N.W., the water falls and runs rapidly along the South shore beyond Indio Point, while it is imperceptible to the northward.

When gales from the North, or winds from N.W. to East prevail, the river falls a great deal, and the current runs to the S.E. and South; and when pamperos prevail, the river rises and the current flows to the N.W., West, or S.W., according to the direction of the channels.

The movements of the waters at Buenos Ayres are more regular than at other parts of the La Plata. The flood here runs $5^h\ 20^m$, and the ebb $7^h\ 5^m$.

If the water rises for a longer time than the duration of a tide, in a calm or light breeze from N.W. to S.W., it may be inferred that the wind will blow from N.E. to S.E., and that it already blows from that quarter at sea. The mean rate of the current is from 1 to 2 miles an hour, and it is seldom more than 3 miles. It has, however, been found running to the eastward at the rate of 5 miles an hour, at 5 miles W.S.W. of Lobos Isle.

During the months of March, April, and May, the Rio de la Plata is higher than in the other months of the year, on account of the rising of the tributary rivers, which carry away whole trees, brambles, and weeds, and which form into small masses like islets, sometimes rather large, and known by the natives under the name of Camalotes.

Ground Log.—From what has been said of the irregularity of the currents in the La Plata, and the importance of knowing a vessel's position, it will be easily seen how useful the ground log may be made, which alone in the absence of land, &c., can indicate the strength and direction of the current; but, notstanding its simplicity, we fear it is seldom in use. We cannot too strongly call the attention of the mariner to this subject, when the depth of water will admit of its use. The very smallest line that will haul in a lead of 5 or 6 pounds weight is the best. The lead should be rounded, long, and tapered at each end, in order that it should sink fast, and be hauled in easily.

The navigation of the Rio de la Plata above Buenos Ayres or Colonia, is not given here, as it is in some degree complicated, and should be conducted by an efficient pilot.

II.—THE COASTS OF LA PLATA AND PATAGONIA, FROM THE RIVER OF LA PLATA TO THE STRAIT OF MAGALHAENS.

The *Coast of the Pampas*, or *Plains of Buenos Ayres*, extends from the River Plata to the *Rio Negro*, or *Black River*, lat. 40° 55′. It is entirely flat, and destitute of harbours. The interior is one vast plain, mostly covered with grass and clover, the food of millions of horned cattle and wild horses. The maritime part next the sea has been called by the Spaniards *El Pay del Diablo*, or the Devil's Country; yet the coast may be approached with safety, as the soundings are regular.

Patagonia extends from the Rio Negro to the Strait of Magalhaens, and is divided into Eastern and Western Patagonia by the Cordillera of the Andes.

Tierra del Fuego takes in all the islands southward of the Strait of Magalhaens (including Staten Island), as far as the Diego Ramirez Islets.

The country inhabited by the Patagonians is open, and, generally speaking, rather level, with occasional hills, and some extensive ranges of level-topped heights (steppes). There are very few trees, and water is scarce. The eye wanders over an apparently boundless extent of parched, yellow-looking, semidesert, where rain seldom falls, and the sky is almost always clear. During a few days in each year, or perhaps at intervals of two or three years, the rain pours down in torrents. The heats of summer are very great; but in winter, though the days are not cold, the frosts at night are severe; and at all times of the year, in the daytime, strong winds sweep over the plains.

On the coast of the Indian country, and Patagonia, to the southward, there is hardly a single place of trade, Patagones on the Rio Negro being the principal. The whole is occupied by various nomadic or wandering tribes, and the southern part is under a cold and cheerless climate. The latter was discovered in 1519, by Fernando Magalhaens, who first passed through the strait which bears his name.

The aborigines are a tall and extremely stout race of men. Their bodies are bulky, their heads and features large, but their hands and feet are small. Their limbs are neither so muscular nor so large boned as their height and apparent bulk would induce one to suppose; they are rounder and smoother than those of white men. Their colour is a rich reddish brown, rather darker than that of copper, yet not so dark as good mahogany.

Nothing is worn upon the head except their rough, lank, and coarse black hair, which is tied above the temples by a fillet of plaited or twisted sinews. A large mantle, made of skins sewed together, loosely gathered about them, hanging from the shoulders to the ancles, adds so much to the bulkiness of their appearance, that one ought not to wonder at their having been called gigantic. Among 200 or 300 natives of Patagonia, scarcely half a dozen men are seen whose height is under 5 feet 9 or 10 inches; the women are proportionally tall; there are also among their number many who are slight and of low stature.

According to Lieut. Musters, R.N., there are three distinct tribes, differing both in language and appearance, viz., the Tehuelches or Patagonians, the Pampas, and the Manzaneros, the whole population numbering about 3,000.

The north-eastern portion of Tierra del Fuego is a better country than Patagonia. The woody mountains of the south-western islands are succeeded towards the N.E. district, by hills of moderate height, partially wooded; northward of which are level expanses almost free from wood, but covered with herbage adapted to the pasturage of cattle.

The climate is a mean between the extreme of wetness and drought, which are so much felt by the neighbouring regions.

The Tekeenica, natives of the south-eastern portion of Tierra del Fuego, are low in stature, ill-looking, and badly proportioned. Their colour is that of very old mahogany, or rather between dark copper and bronze. The trunk of the body is large in proportion to their cramped and rather crooked limbs. Their rough, coarse, and extremely dirty black hair half hides, yet heightens, a villainous expression of the worst description of savage features.

The Yacana-kunny, natives of the north-eastern portion of Tierra del Fuego, resemble the Patagonians in colour, stature, and, excepting boots, in clothing. They seem to be now much in the condition in which the Patagonians must have been before they had horses. With their dogs, with bows and arrows, balls (*bolas*), slings, lances, and clubs, they kill guanacoes, ostriches, birds, and seals.

The names of Patagonia and Tierra del Fuego were given by Magalhaens, the first, probably, from "patagones," meaning very large feet, referring to the Indians; and the second from the numerous fires seen upon that land at night.

For a lengthened and very interesting account of the people, the reader is referred to Capt. FitzRoy's work, "Voyages of the *Adventure* and *Beagle*," Vol. II., chaps. vii., viii., and ix.; also to the work of G. C. Musters, Esq., "A Year's Wandering in Patagonia." (See note on page 522.)

DESCRIPTION OF THE COAST.

On the northern shore of the Plata there is a sprinkling of hills of a gigantic structure, scattered amidst extensive plains; while, on the South, or right bank, there is neither a hill, rock, nor even a stone. So low is the land between Point Piedras and Cape San Antonio, that around the great Bay of Sanboronbon it is extremely difficult to say where the water ends, or the coast line begins. Each difference, of even a foot, in the height of the water, makes a change of cables' lengths, if not of miles, in the position of the limiting line between water and land. In consequence, it is very dangerous for ships to approach that shore; and although the bottom is in many places soft, often extremely deep mud, there are other spaces in which hard lumps of tosca (a species of friable compact sandstone) are found, almost as injurious to a ship's bottom as actual rock. Admiral FitzRoy continues,—"I am not aware that there is any granite on the South side of the River Plata near the shore; and although the name 'Piedras' would incline one to suppose there are rocks or stones near it, I could only find *tosca*."

Point Piedras, is low, very difficult of recognition, and should be approached with the utmost caution. A few stunted trees were visible at a small distance from the shore.

Piedras Bank, a dangerous shoal, extends about 7 miles to the East, and 15 miles southward of the point. It consists of sand and "tosca," as above stated, in its northern part. Within its limits the lead cannot be trusted, the bottom being uneven.

From CAPE SAN ANTONIO, before described, to *Medano Point*, a distance of 42 miles to the southward, the coast is of a light colour, low and sandy. Occasionally straggling bushes, or patches of rough grass, are seen. Sand-hills, between 20 and 40 ft. in height, begin to show themselves 10 miles to the southward of Rasa Point, gradually increasing in number and height as they approach Medano Point, near which they rise to about 100 ft. above the sea.

Medano Bank is an extensive and dangerous shoal, stretching 6 miles seaward from Medano Point. At any time, even in fine weather, it is prudent to give this shoal a wide berth, as at 3 or 4 miles from the shore there are patches of not more than 2 fathoms.

About Medano Point the land is higher than to the northward or to the southward, a range of hills extending inland to the N.W. From Medano Point, for a distance of 60 miles, to the narrow isthmus between the sea and the lagoon called *Mar Chiquito*, the coast is lower than near Medano Point; but it has a similar appearance, sand-hills, with a few patches of verdure, being the only objects on which the eye can rest. These sand-hills, and the coast near them, have a whiter look than those to the northward of the point. In approaching this part, there is no danger while at a reasonable distance from the shore, but it is as well not to go nearer than 3 miles.

From the spot where the Mar Chiquito sometimes overflows the land rises, and is no longer sandy. A low range of cliffs, from 20 to 30 ft. in height, is surmounted by a rising ground, of which the highest part is about 80 ft. above the sea. Pasture land now meets the eye. On the high ground near which is the *Estancia de la Loberia Chica* (Small Seal Farm), thousands of fine cattle may sometimes be seen feeding.

CAPE CORRIENTES, 17 miles farther to the S.W., is a high and rather bold headland, the south-eastern extremity of a range of hills running nearly East and West. The *Sierra Tandil* and *Sierra Vulcan* form part of this range. Near the sea they slope away gradually, and are ended by broken rocky shore. There is a bare sandy place on the East side of the cape, around the upper part of which the green turf has so regular an edge that it appears artificially cut; and all the higher part of the cape is covered by smooth green turf, without either trees or bushes. The highest part is 120 ft. above the sea.

Half a mile northward of the cape is a little bay, where a boat may land in fine weather. The southern side of the bay is bounded by the rising ground of the cape; the northern by the cliffy shore under the Estancia. A vessel may anchor in this bay during off-shore winds, in 5 to 10 fathoms water, over clean sandy bottom; but with easterly winds of any strength a heavy swell would set in, and render the anchorage unsafe.

Mogotes Point is 5 miles South of Cape Corrientes, and takes its name (corn-stacks) from several peaked sand-hills like corn-stacks. *Andres Head,* the next point, is the S.W. extremity of a range of high, bold cliffs; beyond it the shore is low, sandy, and rocky. The bay between it and Mogotes Head should not be entered by ship or boat, as it has many sunken rocks, causing blind breakers at sudden intervals. From Andres Head to *Hermeneg Point,* 12 miles to the southward, the coast is rugged, and from 30 to 80 ft. high, and has neither shelter nor anchorage for a ship. Hence to *Asuncion Point* and *Mount Hermoso,* nearly 190 miles to the westward, the coast has a similar appearance, and is equally unfit to approach. Asuncion Point, a projecting sand-hill 120 ft. high, is difficult to distinguish, even on this unvarying coast.

If a vessel should anchor near any part of this coast, it is probable that she will lose or break her anchor in endeavouring to weigh. Hard tosca, full of holes, receives the anchor in most places. In one week the *Beagle* broke three anchors during rather fine weather. By heaving nearly up and down, and waiting several minutes before attempting to weigh the anchor, the tosca will probably crack or crumble, and give way before the steady strain of the anchor; but if a sudden, forcible strain is applied, the anchor or cable will give way sooner than the tosca.

BAHIA BLANCA lies at the western extremity of the coast just described. Captain (afterwards Admiral) FitzRoy here found the water much discoloured. Mount Hermoso is a little hill, about 140 ft. above the sea, lying near the head of the bay; on this low coast it is somewhat remarkable, as being the only peaked hill close to the water, and having under it a low, cliffy point, the only one thereabouts. Near it is a roadstead, at the head of Blanca Bay, close to the entrance of Port Belgrano, but divided from it by a bank.

The Sierra Ventana, a high mountain, 3,500 ft. above the sea, and still more remarkable from its lying in this low country, is to the northward of the Bahia Blanca. It is called by the country people (Gauchos) Monte Hermoso, or beautiful, from its fine and striking appearance, but the term is now restricted to the little mount before mentioned. A good bearing (astronomical, if possible) of the Sierra Ventana, and the latitude of the ship, will fix her position with certainty.

The deep bight formed by the sudden change in the direction of the coast on each side of Bahia Blanca is called the *Rincon* (corner). Generally speaking, it is shallow. Throughout the space, within the depth of 20 fathoms, there is anchorage with North and West winds, which are the most prevalent. In the Rincon, and along the coast to the eastward and southward, the bottom is invariably sand, or sand mixed with broken shells or gravel, but its quality is very different in different situations, and requires great attention, whether for anchorage or for avoiding the numerous and very dangerous sand-banks. On and near the banks the sand is always of a dark brown colour, very fine, and generally unmixed with other substances, except sometimes bits of shells. On this ground the recovery of an anchor is always very doubtful, as most of the banks are of tosca, covered by this dark brown sand or pulverised tosca. In the offing, over very soft ground, the sand is speckled, or black and white, rather fine generally; when coarse, it is mixed with gravel; broken shells are also frequent. With these last soundings the seaman may be certain that he is out of danger from a shoal, and that he may drop an anchor with confidence.

PORT BELGRANO is at the head of Blanca Bay, and is the first harbour southward of the Rio de la Plata. It is an excellent and extensive harbour; the channel to it, in a W.N.W. direction, is deep enough for any ship, and a soft muddy bottom. The land around is exceedingly low, and the ground is covered with saline deposits. From the land being so low, the water being intersected by banks, and having so few marks, it is very difficult of access; and no place can offer less that is agreeable to the eye, especially when the tide is out, and much of the banks show above water. A succession of similar inlets, indenting a half-drowned coast, extend hence, almost to the Rio Negro; and although the dangers are numerous, tides strong, banks muddy, and very steep-to, and the shores everywhere low, the intervening ports are safe and likely to be useful. They are *Falsa Bay*, *Green Bay*, *Brightman Inlet*, *Union Bay*, and *San Blas Inlet*. The climate of Port Belgrano is delightful, and healthy to the utmost degree, notwithstanding such extensive flats, half covered with water, and so many large mud-banks. Perhaps the tides, which rise from 8 to 12 ft., and run 2 or 3 knots an hour, tend to purify the air; indeed, as the whole inlet is of salt water, there may be no cause for such effects, as would be expected in similar situations near fresh water.

Argentino, the Buenos Ayrean settlement and fort, lies some distance beyond Port Belgrano, in the midst of a level country, watered by several brooks, and much of it thickly covered with a kind of trefoil. It was commenced in 1828, as an advanced post, and has not made much progress since.

The most serious objection to the locality, as an agricultural, or even as a mere grazing district, is the want of rain. Two or three years sometimes pass without more than a slight shower. Good fresh water may generally be obtained, independent of the few running streams, by digging wells between 4 and 10 ft. deep. There is but little firewood. Deer and other game are numerous, and fish swarm in the creeks. Fresh beef may be procured at the fort.

Falsa Bay is an extensive and dreary waste, surrounded by sand-banks, and neither land nor landmarks can be seen until a vessel is within the banks, and then they are not wanted. The same remarks, as to the banks and the passages between them, apply here as to Bahia Blanca, and to Green Bay and Brightman Inlet. It is high water at Falsa Bay at 5^h 30^m.

To the South and West of Falsa Bay the *Laberinto Shoals* extend to the S.E. from Ariadne Island to lat. 39° 27′. They are nearly all under water; the outermost and most dangerous is the *Paz Bank*, of 4 ft. water. As the land is in sight, it is not difficult to avoid it in daylight. *Laberinto* or *Labyrinth Head* is a perpendicular bluff, 40 ft. high, apparently a termination of the shore on the South side of Brightman Inlet.

Green Bay is beset with shoals in the interior, though the entrance looks somewhat tempting. If necessary to enter, take low water, and keep close to Green Bank, and anchor to the North of the narrow passage off the East end of Green Island, with the peaked hillocks bearing W. by S. southerly. The flood tide sets across the entrance, not into it. It is high water at 5^h 10^m, full and change; springs rise 12 ft., neaps 8 ft.

A vessel approaching *Brightman Inlet*, with a view to anchoring, should not go to the northward of lat. 39° 30′. Still more South will be safer, as to the North of it is dangerous, while South it is quite free from outlying dangers. There is abundance of game on Green Island, and good water may be got by digging wells about 8 ft. deep on Green Island. Fuel in abundance may be got on the main land.

River Colorado.—The mouth of this river, which will admit vessels not drawing more than 7 ft., lies 24½ miles South from Labyrinth Head, the coast between being low, but quite free from dangers. The bar at the entrance, and the banks within, are constantly shifting. *Union Bay*, 7 miles southward of the Colorado, will suit vessels drawing less than 17 ft. In smooth water and fair wind a larger ship might enter, but the depth of 15 or 16 ft. is usually draught enough.

SAN BLAS BAY, to the southward of the low islands and extensive sand-banks of *Anegada Bay*, is no place for a ship to enter, unless under favourable circumstances of weather, wind, and tide. It is decidedly dangerous with a south-easter, because there is then a sea on the banks outside which confuses the pilot's eye, and prevents his distinguishing the proper channel; besides which, thick weather, if not rain, is the general accompaniment to that wind. In the middle of the entrance to San Blas Bay is a rock, with 8 ft. least water on it, which is very dangerous. The extreme dryness of the place causes great injury to shipping, and something at the bottom acts chemically on the iron cables, and corrodes them in a surprisingly short time. An English oak-built ship was rendered unseaworthy by being moored for four months here, and the cables were reduced one-third in size. Fresh water may be procured from the wells, and wood and provisions from the inhabitants.

Between San Blas and the River Negro the stream of tide begins to set northward at half flood, and continues to run in that direction until half ebb. Off Raza Point it is high water at noon, on full and change; tides rise 12 feet.

RIO NEGRO.—In coming from the eastward for Rio Negro, the navigator should endeavour to make the land in about the parallel of 40° 52′ S., long. 62° 15′, when he will first see Point Raza, which will be readily known by three remarkable hummocks. After approaching to within about 3 miles of this point, he has to steer S.W. toward Rio Negro, taking care not to come into less than 6 or 8 fathoms of water, with a sandy bottom. The shore is a continuation of low sand-hills, interspersed with heath and brushwood, until you approach the river, where the hillocks become more elevated, and are composed of clear white sand, lying in ridges or undulations like the waves of the ocean.

The mouth of the Rio Negro is situated in 41° 4′ S., and 62° 44′ W. The river is supposed to rise at the foot of the Andes, whence it runs generally in an easterly direction towards the sea. Its width at the mouth is about 2 miles, but it rapidly narrows; and at the town of Patagones, only 16 miles from its embouchure, it is about 450 yards. It does not decrease much in width above the town for the next 20 miles; but it is entirely unfit for navigation, even for the smallest class of merchant vessels, beyond 4 miles above Patagones.

The river is full of small islands and banks, the latter generally of sand. The former, when at all elevated, which is rare, are valuable for agricultural purposes, as the soil upon them is rich, and the proximity of water renders it moister than along the banks of the river and elsewhere. They are, however, generally flat, and are partially if not totally inundated every high tide. There are eight hours ebb and four hours flood tide. The current down the river is very strong.

Floods occur twice during the year—once in December or January, occasioned by the melting of the snow on the Andes; the other in June or July, caused by heavy rains in the interior. The summer floods, when very strong, do much injury to the cattle and crops along the banks. They are, however, usually considered by the inhabitants, especially if they occur early in the season, to be of great importance and benefit, as they bring the only water they can depend upon to moisten the parched land, and render it fit for cultivation.

The Rio Negro is a bar river. The bar is situated about 4½ miles from the entrance, and is exceedingly dangerous to vessels passing over it. There are as many as six channels by which the water of the river discharges itself into the sea. Three of them have sufficient depth to allow vessels drawing 11 ft. of water to pass safely over; and one has water for vessels drawing only 9 ft.; the two others are of little depth, and are continually shifting.

Vessels drawing as much as 14 or 16 ft. have occasionally passed and repassed the bar, but it is considered highly dangerous, and can only be accomplished at peculiarly favourable periods; but no vessel drawing more than 11 ft. of water should attempt to enter the river, and not then unless the local pilot, who resides at the mouth of the river, is on board.

It is necessary to be remembered, that though vessels drawing as much as 14 ft. would be able to cross the bar and enter the river, after a succession of south-easterly or easterly gales, yet the wind necessary to enable you to leave it would have an opposite effect, and would lessen the depth considerably; therefore, if a vessel drawing much water should ever be taken into the river, it is a great chance if ever she leaves it again.

The bar and the numerous sands at the mouth of the river are composed of quicksand, and their position is continually shifting; therefore no plan, however accurately surveyed, can be depended upon for more than a few months. The local pilot has two landmarks fixed on the North bank at the entrance of the river, to assist him in bringing vessels through the channels, but he is obliged to change their position frequently, especially after a severe gale or heavy floods.

Many places that were dry land a few years since are now covered with water, and *vice versa*. Soon after the first settlement was formed, a lighthouse was built on the North bank of the river; its site is now entirely covered by the sea.

There are many flat shoals and banks in the river between the mouth and the town of Carmen; they are composed of sand, and in some places, on the North side of the river, of sandstone, rendering the navigation of the river dangerous to strangers. There is, however, a local pilot paid by the Buenos Ayrean government. This person has orders to board a vessel before crossing the bar. Previous to the appointment of any regular pilot, many vessels were lost on the bar and in the river; indeed, its banks and the whole coast for miles on each side of the mouth were strewed with wrecks.

Patagones, or El Carmen, situated in a bend of the Rio Negro, 18 miles from its mouth, is built on either shore of the river, here about 450 yards wide. The principal part of the town is at present on the North side of the river, although the new settlement of El Merced, on the South side, threatens eventually to rival it. Ferry boats ply between the two towns. On the North side of the river is a pier, constructed for the use of the steamer which journeys between Buenos Ayres and this port. El Carmen is built on the side of a hill, on which is situated a conspicuous fort, built by Viedma, who founded this colony in 1779. In 1832 the population of Patagones was estimated at 800; in 1870 Mr. Musters estimated it at 2,000.*

It is high water at the bar, on the days of new and full moon, at $11^h 15^m$; and the water there rises 11 ft. on the spring tides, and 8 ft. on the neaps; but when the wind blows strongly from the S.E. the tide rises from 12 to 14 feet.

Along the coast is a regular tide of of 6 hours flood and 6 hours ebb; but the flood tide inclines rather towards the shore, about N.E. by N., at the rate of 2 or 3 miles an hour. Consequently, in entering the Rio Negro, particular attention must be paid to the currents and tides, which set strongly to the N.E. round the Point de Maine, or outer point.

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* For an interesting account of Patagones, *vide* "At Home with the Patagonians: a Year's Wanderings over Untrodden Ground, from the Straits of Magellan to the Rio Negro." By George Chaworth Musters. London: John Murray, 1871.

Tho Rio Negro separates the Provinces of La Plata from Patagonia.

GULF of SAN MATIAS, or St. Matthias Bay.—From Rio Negro the coast trends westerly for about 100 miles, whence it sweeps south-easterly in a broad semi-circle, terminating in a peninsula, which projects to the N.E., thus forming the extensive Gulf of San Matias.

The north-eastern side of the gulf is formed by the South Barranca range of hills, which extend from the Rio Negro to Belen Bluff, being highest (about 300 ft.) near Belen Bluff. Thence nearly to Bermeja Head, the low land above and inshore of the cliffs is extremely level. Near *Bermeja Head* (sometimes, but erroneously, called Cape Two Sisters) there are hummocks and irregular hills nearly covered with rough verdure. At the N.E. part of these considerable heights are two small peaks standing over two peculiar cliffs. Off all this coast, and in all other parts of San Matias Gulf, the sea appears to be clear of all danger.

Port San Antonio, at the head of the gulf, is the best place on the coast for a large ship in want of repair, although in an out-of-the-way situation. In *Escondido Creek* the keel of a large ship may be examined, the rise of tide being 24 to 32 ft. No fresh provisions, except game and fish, can be procured. In approaching Port San Antonio from the south-eastward, Direction Hill and the Fort Hill will be first seen; if from the South, the Fort is seen soonest, a more singular resemblance to a regular fortification it would be difficult to form. *Direction Hill* is 560 ft. high, and three small hummocks close together are seen on its summit.

The entrance to the port is much exposed to S.E. winds; at such times it would be imprudent to approach it without a probability of speedily entering it, as you would be embayed, and have to contend with a heavy, rolling sea. On each side of the entrance is a bank partly dry at low water, and very steep at the edges. For entering, keep Direction Hill W.N.W. until the fort bears S. by W., when you will see the hummock on Villarino Point bearing N. by E., and the Nipple Hill (a hill 600 ft. high, on the range of down-like heights North of the port) showing over it on the same bearing. With these bearings on, steer about North, allowing for tide, so as to keep the Nipple just open of the West extremity of Villarino Point, which is low and sandy, with a few verdant hummocks on it, until you are half a mile from that part of the point, when you may go by the eye close to the East Bank, round the point to the berth most convenient. It is high water, full and change, at $10^h 45^m$; the rise of the tide depends much on the wind, being generally between 3 and 5 fathoms.

The *Tide Races* near and in the Gulf of San Matias are remarkable. Admiral FitzRoy says: "On the 6th of May, 1833, while returning from San José to the River Negro, our little vessel got into a ripple, which did not break, but had almost the appearance of a whirlpool. There was a short, hollow swell, and an irregular motion in every direction, exactly like the boiling of a pot on a great scale. Here again they would touch no bottom with 50 fathoms of line and a heavy lead. These races and ripplings in such deep water about the peninsula of San José are very remarkable; chiefly because there are none such on any other part of the coast."

The tide races are less formidable within the bay than off Point Norte, or outside.

Port San Josef, on the South side of the bay, is a barren and desolate place, without wood or fresh water, and too large for a harbour. On each side of the port are bold cliffy headlands, with deep water to seaward; but a shoal ledge runs from one to the other under water. The tide stream rushes into and out of it in a violent manner, especially when opposed by wind; but after the narrow part of the entrance is passed, all agitation of the water ceases, except what may be caused by wind. That it is too large for a harbour, there was proof at the time of the *Beagle's* visit, for they found the wreck of a small vessel at the N.E. part of the port, which had been driven from her anchors and totally lost, though she was lying in a land-locked bay, or rather gulf. It is high water in the entrance, on full and change, at 10ʰ; rise, 25 feet.

From the East side of Port San Josef to Norte Point, 27 miles distant, there is a continued cliff, from 60 to 100 ft. high. No high land appears near the shore; all looks low, bare, and sunburnt. No danger lies under water, but the tide races off it, and to the eastward of Norte Point, are troublesome and dangerous. *Norte Point*, or *Lobos Point*, is lower than the adjacent cliffs, and a reef projects under water about a mile, so that it must not be approached within that distance; beyond it is deep water.

From Norte Point to Valdez Creek the land is low, mostly a shingle beach, and off this coast are the worst tide races, being occasioned by rocky patches lying from 2 to 10 miles off those S.E. of Norte Point.

Valdez Creek, a dangerously deceiving inlet of a singular character, may be known by the shingle beach ending, and by a line of cliffs commencing at Cantor Point on the South side, and extending to *Ercules Point*, a high, white cliff. The entrance to Valdez Creek is narrow, and sometimes entirely closed up by shingle. From Cantor Point to Nuevo Head the upper part of the coast is nearly horizontal.

NUEVO GULF is easily known by the two well-defined headlands at its entrance. Off Nuevo Head, the easternmost, no danger exists; it is steep-to, 200 ft. high, and bold. *Ninfas Point*, the westernmost, is 240 ft. high, and makes as a double point. It ought not to be approached within 2½ or 3 miles, on account of rocky ledges extending from it. In mid-channel you are out of the ripplings, and the tide is sufficiently strong to carry a vessel to windward, while hove-to, in a fresh gale. When once well inside the heads, the tide is much less strong, and there is no danger. The cliffs here and to the northward contain prodigious quantities of fossil shells.

Whale ships, having good ground tackling, may lie in any part of the bay in perfect safety. The best anchorage is on the West side, in from 5 to 10 fathoms, at about a mile off shore, as in this part easterly winds seldom, if ever, blow with sufficient violence to injure any ship lying with her anchor ahead.

Cracker Bay is the second bight westward of Ninfas Point, where H.M.S. *Volage*, 1876, anchored in 10 fathoms, mud, nearly midway between the East and West white cliffs, and at half a mile from the beach. This anchorage is used in preference to that of Port Madryn by vessels bringing cattle for the Welsh settlers at Chupat, as fresh water in small pools is found near the head of the bay. It is high water, full and change, at 7^h 10^m; springs rise about 13 ft., neaps 10 ft.

Port Madryn is the westernmost bight in Nuevo Gulf, and affords good anchorage in 10 to 12 fathoms, mud, at about a mile from the shore. Shoal and rocky ground extends 7 cables N.W. and 1 mile N.E. from Cave Bluff. H.M.S. *Volage* anchored with Cave Bluff bearing S.E. ½ E., distant a little more than a mile.

Hares and partridges may be shot in the vicinity of Port Madryn, but they are not numerous. Fish of good quality, particularly smelt, may be caught in large quantities either with the seine or with hook and line. Abundance of brushwood for fuel may be obtained, but no fresh water. The distance overland to the colony is 40 miles by a road suitable for carts, which is visible from the anchorage.

The RIVER CHUPAT, the mouth of which is in lat. 43° 20½′ S., was discovered by Lieut. Wickham in 1833. The shores are of a rich alluvial soil, covered with immense timber drifts. Some of the trees are large and sound, lying several hundred yards from the banks, showing that the periodical floods must be great. The river itself is free from drift timber, but is shoal and narrow, only vessels not drawing over 8 ft. can enter at high water, in fine weather. At high water there are depths of from 7 to 12 ft. over the sandbanks, which block up the mouth of the river. The anchorage off the mouth in Engano Bay, being exposed, large vessels visiting the colony have to anchor in the S.W. corner of Nuevo Gulf. The stream runs down at 2 or 3 knots an hour. It is high water, on full and change, in the entrance, at 7^h 10^m; rise, 13 feet.

In 1865 a colony was formed by a party of 150 Welsh people, under Mr. Lewis Jones, 6 miles above the mouth of the river. Owing to reports of the colony being in great distress, they were visited in 1871 by Commander Dennistown, of H.M.S. *Cracker*, and by Capt. Fairfax, H.M.S. *Volage*, in 1876, who reported that the village was then broken up, most of the colonists residing on their own farms, some of which are 23 miles above the mouth of the river, and nearly all on the right bank. The colonists, about 700 in number in 1876, were in excellent health and spirits. Two small vessels formerly visiting the colony had been wrecked, their only communication with Buenos Ayres then being overland *via* Patagones. It is, however, proposed that the small monthly steamer to Patagones should prolong her voyage twice every year to Chupat. The exports consist of wheat, butter, ostrich feathers, and skins of animals obtained from the Indians: the total value in 1875 was £7,000.

The climate is very healthy, the prevailing winds being westerly and dry. The soil is rich loam, producing good crops of wheat, &c., excepting in seasons of drought, to which this place is subject. It is proposed to construct a canal along the valley for the purposes of irrigation. The S.W. part of Nuevo Gulf is the most suitable anchorage for vessels wishing to communicate with the colony.

PORT SANTA ELENA, in lat. 44° 30′, is a small bay, which was surveyed by the officers of the Spanish sloops *Descubierta* and *Atrevida*, in 1794. It is quite open to the South; and near the middle of the entrance, which is only 1¾ mile wide, is a small shoal of 12 ft.; and at 2 cables eastward from it and forms the northern side of the great Bay of St. George, the southern limit of which is Cape Three Points, in lat. 47° 10′.

Leones Isle, 280 ft. high, situated 7 miles South of Cape Dos Bahias, is 2 miles long East and West, 1½ mile broad, and covered with brushwood; on the summit stands a stone pyramid, which forms a good landmark. A French firm, engaged in the export of oil and guano, have an establishment on the shores of Leones Cove.

The northern entrance to *French Bay*, on the S.W. shore of Leones Isle, is between the N.W. point of Ship Isle and the West extreme of Leones Isle, and is about 2 cables wide with 12 fathoms water; the southern entrance, in which there is generally a heavy swell, is very shallow. The anchorage in French Bay is in 6 to 8 fathoms, good holding ground, on the North side of Ship Isle, and nearly abreast the establishment on the Leones shore. There is good landing on a gravel beach at the head of a small creek near the establishment.

In *Gill Bay*, about 3 miles westward of Leones Isle, there is anchorage in 8 fathoms, at 3 cables N.W. from Basin Bank, which lies in the middle of the bay and is covered at high water. Fresh water may be procured from a well in the northern ravine on the East side of the *Oven*, a creek at the head of Gill Bay.

Egg Harbour *(Port San Antonio)*, situated between San Antonio Peninsula and Valdes Island, 230 ft. high, is sheltered from all winds except those from S.E. The southern entrance, the deepest, is 3 cables wide, with general depths of 8 and 9 fathoms. The best anchorage is in about 6 fathoms, gravel over mud, with the North extreme of Valdes Island in line with the South extreme of Cayetano Islands bearing West. It is high water, on full and change, at 4^h; springs rise 17 ft. The flood tide sets through the harbour from West to East about 1½ knot an hour; the ebb is scarcely felt.

About 5 miles westward of Egg Harbour is *Port Melo*, formed by two groups of islands, in which good anchorage may be obtained in about 5 fathoms, sand, with Portugal Point, the East entrance point of the port, bearing S.S.E.

Tova Island, 6 miles S.W. of Port Melo, is 4 miles long E.S.E. and W.N.W.; it is divided at high water into four parts. At three-quarters of a mile eastward of East Islet lies a dangerous reef, covered at high water. There are several rocks above and below water, extending about a mile from the S.W. shore of Tova Island. *Sea Lion Rock*, covered at high water, lies three-quarters of a mile North of the N.W. extremity of Tova Island, and *Penguin Rock* lies 2½ cables northward of East Point.

Anchorage Bay, 1½ mile West of East Point, affords a well-sheltered anchorage in 4½ to 5 fathoms, over sand and clay, with the centre of Gull Islet bearing E.S.E., distant 3½ cables. On the northern part of Gull Islet is a stone pyramid. *North-West Bay*, 1 mile West of Anchorage Bay, affords good anchorage in 7 fathoms, gravel and clay, with the pyramid and beacon on the western shore in line, and a short distance East of the line of the two beacons on the southern shore. It is high water, on full and change, in Anchorage Bay, at $3^h\ 45^m$; springs rise 18 ft.

Medrano Rocks are a dangerous cluster of rocks, awash at low water, lying 2 miles S.E. by S. from the East extreme of Tova Island.

Port Malaspina, in about lat. 45° 12′, long. 66° 39′, is fronted by the Viana Islets or Rocks, behind which vessels may find shelter from every wind, the S.E. excepted. In approaching this small bay, you will see the *Tetas* or *Paps of Pineda*, to the North, abreast of which you may anchor in from 10 to 6 fathoms water, fine sandy ground. Port Malaspina is a mere rocky inlet, unfit for anything except a boat.

There are many other good anchoring places between this and Cape Blanco, the southern extremity of St. George's Bay, which require no particular directions, as the coast is bold and clear of danger within half a mile of the shore. Easterly winds never blow here with any degree of violence; so that whalers may cruize about these shores in the calving season with the greatest safety.

CAPE TRES PUNTAS, or Three Points, is very easily discerned, and may be known by its very level outline, being a long range of table land, higher than any part near it, and visible from the deck for more than 20 miles. To the S.E., detached, but near the range, there is a conical hill, which is readily discerned from the northward, but from the N.E. is not seen, being concealed by the ranges of land behind it in the S.W.

CAPE BLANCO and SHOALS.—Cape Blanco, in lat. 47° 15′, is 7½ miles to the south-eastward of Cape Three Points. It is a low, rugged tongue of land, terminated by a rounded but very rugged hillock, and two smaller ones, which, when first seen, appear to be islands detached from the coast. The neck of land which forms the communication with the coast is low and sandy, and probably offers, on its South side, shelter from southerly winds.

From the summit of Cape Blanco, patches of shoal water are seen towards the N.E. and S.E., some 10 or 12 miles off shore, on and about which are ripplings and overfalls more or less violent according to the time of tide, and the direction and strength of the wind. Over these shoals there is but little water in many places, the soundings are very irregular, and a vessel should entirely avoid them. H.M.S. *Adventure* passed over two of them, and had not less than 5 fathoms, but possibly at low water the depth may be considerably less; they are thrown up by the force of the tide, which sweeps with great strength round the cape, into and out of the Gulf of St. George.

The North and South ends of *Byron Shoal* bear respectively from Cape Tres Puntas and Cape Blanco, E. by N. ½ N., distant from the former 7 miles, and from the latter 5 miles; consequently it extends in a N.W. ½ N. and S.E. ½ S. direction for 6 miles. It is scarcely a quarter of a mile wide.

The North end of *Anne Shoal* bears E. ¾ N., 7 miles from Cape Blanco, and extends in nearly a southerly direction for 2 miles. Between these shoals there is a passage 2 miles wide, and the depth gradually increases to more than 15 fathoms.

Within these shoals are two others: a small one with 2 fathoms on it, bearing E. ½ S., distant 2 miles from Cape Blanco; and another 2-fathoms bank, which has been named after the cutter *Susannah*, which struck on it. It is 2½ miles long, and nearly a mile broad; its direction is S.S.E. and N.N.W., and its northern end lies 3½ miles S.E. by S. from Cape Blanco.

There is probably more shoal ground to the N.E., for having approached the land within 14 miles, with Cape Tres Puntas bearing S.W. ½ S., the depth rather suddenly decreased from 40 to 14 fathoms, pebbly bottom, being then about 10 miles within the 50-fathoms edge of the bank. On approaching the land, the quality of the bottom becomes irregular, and changing from oaze to sand, with pebbly shoal patches; so that by attention to the soundings and nature of the bottom, these shoals may be easily avoided.

A good mark to avoid them is, not to approach so near to the cape as to see the rugged hillock of Cape Blanco, and to keep the high land of Cape Tres Puntas visible from the deck about 20 miles, on the horizon.

The flood or northerly tide ceases in the offing at 4^h 15^m, but near Cape Blanco and among the shoals, the tides may be less regular: they produce strong ripplings, and set with considerable strength.

Off the coast southward, between Cape Blanco and Port Desire, within the distance of 3 to 5 miles from shore, are several small patches of rock, which uncover at half tide; but beyond that belt the coast is free from any known danger, and may be approached by sounding in not less than 14 or 15 fathoms; within that limit the ground is foul.

PORT DESIRE is at the mouth of a river of the same name, 33 miles to the southward of Cape Blanco. It has rather a difficult entrance from the strength of the tide and its narrow breadth, and it is rendered still more confined from several reefs that extend off the North shore, or that lie nearly in mid-channel. The North point of the entrance is a steep bluff, and is therefore remarkable as being the only point of that description along this part of the coast. At 4 miles N. by E. ½ E. from this bluff are some rocks called *Sorrell Ledge*, a quarter of a mile without which the depth is 13 fathoms. *Tower Rock*, on the South side of the port, becomes visible after passing this ledge; it opens out when the North bluff bears S.W. ½ S. The anchorage is off the ruins on the North shore, and the vessel should be moored. These ruins mark the site of a Spanish colony, founded in 1829, which, not answering the purpose, was soon given up.

Supplies.—At 4 miles above the ruins there is a small peninsula, connected by a narrow isthmus to the North shore; by sending a party up, and stationing men with guns on the isthmus, it is very likely that several guanacoes may be shot as they are driven across it, for the peninsula is their favourite feeding place. These animals are abundant, but unless stratagem be used they are very difficult, from their shyness, to be approached. The easiest way of shooting them is by lying in wait, at break of day, near the places where there is fresh water. Guinea-pigs are also numerous, and excellent eating.

There are some holes, near the ruins, which generally contain water, but of so brackish a quality as scarcely to be worth notice. On the islets farther up the inlet, and in many of the valleys, firewood of a superior quality may be freely obtained. Of edible vegetables there are few or none; good wild-fowl are plentiful, and fish, especially shell-fish, are abundant.

Once or twice in the year a large body of Indians visit this place as if to reconnoitre, and therefore no straggling parties from the ship, much less individuals, should venture to any distance without having ascertained that the natives are not in the neighbourhood. "War to the knife" with all white men is their maxim, in consequence of the treatment they have received from the Spaniards and their descendants.

It is high water, full and change, at Port Desire, at 0^h 10^m; springs rise 18½ ft. The tides set in and out of the port with regularity. It should be borne in mind, when approaching any part of the coast between Union Bay and Port Desire, that there is a difference of half a tide, or 3 hours nearly, between the turn of the tide-stream in the offing and the time of high water in the harbours. Three hours after high water in the harbours, or rather upon the shores, the tide ceases to run to the northward, and begins to run in a contrary direction. Also 3 hours after low water on the shore the tide turns in the offing.

A vessel bound to Port Desire, or merely wishing to anchor in the bay which fronts it, may procure a good berth in 7 fathoms, at low water, well sheltered from the westward, from N.N.W., round westerly, to S.E., with the North bluff bearing N.W. ½ W., and Tower Rock W. ¾ S. This position being a little to the southward of the fairway of the port, and about 1½ mile from the nearest shore, is out of the strength of the tide. The bottom is strewed with rounded stones, but the holding ground, although of such suspicious quality, seemed to be good.

By waiting for low water all the dangers that exist will be seen, and the vessel easily dropped in with the tide, should the wind be, as it generally is, westerly. The course in is about W.S.W., and the distance from the entrance to the anchorage 1½ mile.

Capt. FitzRoy adds to the above account by Capt. King, that vessels of 300 tons will not find easy access to Port Desire, the narrow and crooked entrance, the strong tides, the short interval of slack water, and the uncertain bottom, are sufficient obstacles to deter any large ship from making the experiment, unless urged by necessity.

Penguin Isle, 11 miles S.E. of Port Desire, is bold on its outer side, and may be passed very close without danger, for the stream rather sets off than towards the shore; but the tide hereabout is very rapid, and forms, even in a calm, strong ripplings, which in a breeze must be very dangerous for boats. The flood sets to the northward, and during its strength more than 3 knots; the ebb was found to have set 15 miles to the southward in 5 hours. Off the island the northerly stream ceases at about 4 hours, or 4½ hours after the moon's passage, which is 3½, or 4 hours at least, after high water on the shore.

SEA BEAR BAY, according to Capt. King, one of the best anchorages on this coast, is in lat. 47° 56′ 49″, long. 65° 44½′, but it is difficult of access without a leading and fresh wind, on account of the strength of the tides, which set to the northward, through the narrow channels separating the rocky islets that appear between Penguin Island and the mainland. The bottom besides is not only deep, 23 to 30 fathoms, but is very foul and rocky; and although a ship may be prevented from drifting through by dropping an anchor, yet its loss, from the foulness of the ground, would be almost certain.

In entering the bay, border pretty close to the low rocky point to the southward, in order to avoid a reef that lies about a quarter of a mile N. ½ E. from it; but as the sea always breaks upon it, the eye and a due consideration to the tide are the best guides. The reef extends some distance to the eastward of the breakers, and therefore the tide, when within it, sets in or out of the bay, but with little strength.

No wood of any size is to be procured here, and scarcely any water. The passage to the watering holes is over a small rocky bar, which a boat may cross at three-quarters flood: it is immediately within the eastern point of the bay. There is a small spring at the North end of the third sandy beach, which a herd of guanacoes was observed to visit every morning; but as the water trickles down in a very small quantity only, it cannot afford more than a temporary supply. Two of the three wells at the point were found to be full of sea water, which had breached over the rocks; the other contained about 40 gallons of rather a brackish taste.

Besides a good and secure anchorage, this place affords no other advantage, but it is convenient for sealing vessels while the people are employed upon Penguin Island. It is high water, on full and change, at 12^h 45^m; rise 20 ft.

Spiring or Ferrer Bay is contained between the South head of Sea Bear Bay and a point of land within *Ferrer Islet*, or *Shag Rock*, which lies in lat. 48° 8′ 25″, long. 65° 53′ 30′. The bay is much exposed, being quite open to the South and East; and at the conclusion of a S.W. gale, when the wind always veers to South and S. by E., there is a considerable sea. The shore is skirted for some distance off with many rocks, and the bay altogether is quite unfit for anchorage. The height of the land is the same as that about Sea Bear Bay, but has more nodules or lumps of rocky hills on the outlines of its summits.

Ferrer or *Shag Rock* is a whitish mass, perfectly bare, at about 1½ mile from shore; at 2 miles southward of it are four small dark-coloured rocks, and a mile South from it is a rocky islet. On the land, and at a short distance from the coast, are three hills, which appear, when a little to the southward of Sea Bear Bay, like three round-topped hills, but on reaching more to the southward they appear to extend in length, and form into two hills; and at 9 miles to the southward of Shag Rock they look like one mass of table land.

Sirius Rock was discovered by a ship of the name striking on it on March 10, 1849. It is about 10 miles E.N.E. of the South point of Spiring Bay.

Watchman Cape, the *C. de los Desvelos* of the Spanish navigators, is situate near lat. 48° 18′ 55″, long. 66° 18½′. It is very low, but may be known by a bell-shaped mount, which stands at about 2 miles from its extremity, and from the southward resembles, in shape and colour, Monte Video, in the Rio Plata, but is not so high. It is likewise called *Monte Video*, or *Redonda*. Its position is that given above.

At 6 miles northward from the extremity of the cape is a shoal with kelp upon it, on which the least water is 3 fathoms, but on approaching it the depth gradually decreases; there are also many other shoal patches, but all are covered with seaweed. The *Adventure* passed several in 7 and 9 fathoms.

The ground is very foul and uneven for more than 4 miles from Watchman Cape, towards Bellaco Rock, but not quite out to it. Hence the coast trends to the westward, and becomes higher.

Bellaco Rock, or *San Estevan Shoal*, which was discovered by the *Nodales* in 1619, was again found by Capt. Stokes in 1828, on his passage down the coast, and its position was then ascertained to be, lat. 48° 30′ 50″, long. 66° 10′. It bears S.E. by S., 10½ miles from Watchman Cape, and S.E. from Monte Video. The rock appears like a dark mass, about 9 or 10 ft. above the water at high tide, and in form of a boat turned bottom upward. Within half a mile of its South side the *Beagle* sounded in 12 and 15 fathoms, rocky bottom; and on its East side, at the same distance, the depth is 20 to 24 fathoms. Capt. FitzRoy says that there are at least two distinct masses of rock, and that a ship may pass between them. The larger, or eastern rock, is about 300 yards long and 80 yards wide, with kelp growing on most parts of it, which most likely will prevent the top wearing away, while so protected by seaweed. According to the tide (which rises 20 ft.), it will appear nearly awash, or as high as the hull of a ship. The ground around it being foul and uneven, the coast in the vicinity should therefore be avoided.

And here it may be noticed that the whole of the coast between Cape Blanco, in lat. 47° 15′, and Port St. Julian in lat. 49° 12′, is more or less strewed with shoals, which are the more dangerous from the strength of the tides setting between them. In navigating, generally, off the coast, the depths and quality of the soundings will be a guidance; observing that, when the depth exceeds 40 fathoms, there exists no known danger. By night, in particular, regard should be paid to the tide, which runs in considerable strength, parallel with the shore.

PORT ST. JULIAN.—*Cape Curioso*, on the North side of the entrance of Port St. Julian, is situate in lat. 49° 11′ 10″, long. 67° 35′. Between Watchman Cape and this port the land is of moderate height.

Wood's Mount, in lat. 49° 14′, long. 67° 44′, is visible from the deck for at least 33 miles, and is a good mark for Port St. Julian, being flat-topped, 950 ft. high, and much more elevated than the land about it. The trend of the land may also be a guide on approaching; but as the land about the port is higher than that either to the northward or southward, and, as Wood's Mount is so remarkable, no mistake can be made. In a line with the South point of the entrance the mount bears W. by S. ½ S. The North head, Cape Curioso, is a low point jutting out to the northward; it is formed of cliffs horizontally stratified, of which the upper part is whited-brown, and the lower generally black, or black streaks.

Keeping Wood's Mount W.S.W. will lead to the South Head, which will be easily distinguished when at the distance of 6 or 8 miles or more, according to the state of the weather.

The bar of this dreary port is shingle (or gravel), and often altered in form by S.E. gales, or unusual tides. Under ordinary circumstances, the tide rises 30 ft. at full moon.

The land to the southward of Port St. Julian is uniform, flat, and low; it is covered by scrubby bushes, and fronted by a shingle beach. At 10 or 12 miles South of it, on approaching from the E.S.E., a small flat-topped hill may be seen over the low hills on the coast.

In the parallel of 49° 29′ S. the character of the coast changes entirely to a range of steep white clay cliffs, the average height of which was calculated, by angular measurement, to be about 300 or 330 ft. They rise like a wall from the sea, which, at high water, nearly washes their base; but at low water they are fronted by a considerable extent of beach, partly of shingle and partly of mud. Some short rocky ledges, which break at half tide, lie off certain parts of this range, but none of the ledges extend for more than a mile from the shore. This cliffy range occasionally forms projections, but so slight as not to be perceived when passing abreast of them.

Anchorages along the coast may be taken up, with the wind off shore, at from a mile to 2 miles from the beach, in from 9 to 12 and 14 fathoms, oazy bottom. In lat. 49° 58′ the range of steep white cliffs begins gradually to diminish in height, and terminates at 9 miles farther to the southward in a lower point, *Punta Rosa*, 180 ft. high, which forms the North side of the entrance of *Port Santa Cruz.*

SANTA CRUZ.—This port was discovered in 1520 by Don Juan Serrano, captain of the *S. Iago*, who accompanied Magalhaens in his voyage around the world. The ship was wrecked in this river, but the crew were saved.

The appearance of the coast about the entrance of this river is remarkable, and easy to be known, from the conspicuous manner in which it makes either to the northward or the southward. From the latter direction a coast line of cliffs and downs of considerable height is seen extending from the southward, as far as the eye can reach, and terminating abruptly in the high, steep, flat-topped cliff, *Mount Entrance*, the South point of entrance of the river, which is 356 ft. high; some low land is on the northern side, and outside the river. Twelve miles up the river, on the South bank, is *Weddell Bluff*, 300 ft. high, a conspicuous headland; and 6 miles farther, on the opposite shore, is another called *Beagle Bluff.*

If the object of entering this harbour be wood, water, or to refit, a good berth will be found above Sea Lion Island, and near the shore under Weddell Bluff; but strangers should first anchor in the bight near Keel Point, so that another ebb may expose to view the shoals that surround that island. If it be intended to sight the vessel's bottom, the sloping shingle beach at Keel Point, on the South shore, 3 miles within the entrance where the *Beagle* was placed on shore in 1834, offers a most convenient spot; and the great rise of tide, and clean shore, renders Port Santa Cruz a most desirable place for that operation.

The anchorage off Keel Point is easily taken or quitted, but in moving, all vessels should have their anchors ready, and a boat ahead, for the tides are sometimes strong, from 3 to 6 miles an hour, and the banks are somewhat changeable. In bringing up, heavy anchors should be used, and plenty of cable veered, taking care not to anchor in the strength of the stream; and if near high water, the probable fall of the tide should be carefully considered.

Firewood may be cut near the anchorage, but water can only be obtained by sending the boats up the river; during the last half of the ebb the river water is generally fresh above Weddell Bluff.

At Weddell Bluff the river divides into two: the *Northern Arm*, which passes under the East fall of Beagle Bluff, was examined by Captain Stokes for 12 miles above its commencement, where it ceases to be navigable, even at high water.

Many brant geese, and ducks were seen, as well as the common sea-fowl of these parts, viz., penguins, cormorants, gulls, ducks, and divers; several ostriches also made their appearance on the beach, and traces of guanacoes were observed. The *Western Arm*, which is far the more considerable of the two, was examined by Capt. Stokes for 33 miles. The first reach of the arm runs S.W. by W. 6 miles, with a mean breadth of 2½ miles. At 4½ miles up, the influence of the tides had altogether ceased, and the water was quite fresh.

Capt. FitzRoy undertook an expedition up the river, with three light whale-boats; they laboured by rowing or tracking for sixteen days, when their provisions falling short, they were obliged to return to the ship, which occupied but four days. The utmost point they reached was 140 miles in a direct line to the westward of the entrance, or 245 miles by the course of the river; and they were then within 30 miles of the foot of the snow-capped Andes, and at an elevation of 400 ft. above the sea-level.

In January to February, 1877, Don F. P. Moreno, the well-known Argentine explorer, ascended the river to its source, a lake in about long. 71° 59′ W. The current of the river was very rapid, in 24 hours the boat descended the distance that had taken a month to ascend.

It is high water, full and change, in the River Santa Cruz, at 9^h 30^m; springs rise 40 ft., neaps rise 29 ft., and neaps range 18 ft.; the tides run from 3 to 6 miles an hour. In the offing they turn two hours later, and the flood runs to the northward.

Lieut. Thomas Baker, R.N.R., who entered this port in 1868, in order to effect repairs to the *Greyhound*, of 1,410 tons register, says: "Not having any chart of the port, I anchored outside the bar, which fronts the mouth of the river 4 miles outside the points of entrance. I spent two days in surveying this bar, which is composed of sand and shingle, with a varying depth of from 1 to 9 ft. at low water, and several spots dry.

"Having buoyed the deepest channel, I weighed at two-thirds flood, and crossed the bar; keeping Weddell's Bluff—a steep cliff of about 300 ft. in height of a white chalky appearance, on the South shore, 12 miles within the points of entrance—on the bearing of N.W. by W., and 7 miles over the low part of South entrance point. On this bearing I carried 7½ fathoms within a mile of the entrance, which there deepened to 13 and 14 fathoms, and then no bottom with the hand lead could be found immediately between the points of entrance, which has here a channel of a mile in width.

"I ran the ship close along the South shore, and anchored in 11 fathoms, 3 miles within the mouth of the harbour.

"Twelve miles above this position the river is divided into two arms, the confluence of which has shown up a formidable shoal, extending 12 miles through the centre of the harbour and parallel with its shores, a portion of which is always dry. The spot selected for beaching was above this shoal, and after great trouble in backing and filling, the ship was beached in safety.

"As the tide allowed, we stripped, caulked, and re-metalled the leaky spots in the ship. We found growing on the shore a low brushwood of a resinous nature, some of which we cut, and it gave a splendid light to illuminate our work at night. At the end of six weeks we left this harbour with a tight ship.

"The capabilities of this port as a place of refuge for ships disabled off Cape Horn, is highly important. In it is to be found all that a ship requires to effect temporary repairs; a powerful rise of tide from 45 to 50 ft.; beaches upon which it is impossible for a ship to injure; creeks in which a ship may enter and there discharge her cargo with ease and facility.

"In conclusion, I would not recommend any shipmaster to enter without he has full confidence in himself to work his ship in a strong tideway. My plan was simply to anchor, and, at the next low water, when the shoals were exposed, anchor the boats in the proper channel, and at the next flood dredge to their extent, then again anchor."

COY INLET, in lat. 50° 57′.—Between Santa Cruz and this inlet the coast trends slightly inward, and is formed by a succession of cliffs and intervening low beaches. The inlet is conspicuous, as it is the only part of the coast that appears as such between Santa Cruz and Cape Fairweather, in lat. 51° 32′, long. 68° 55′ 50″.

When within 7 miles of the parallel of the inlet, as well to the northward as to the southward, a ship should keep at the distance of 4 or 5 miles from the coast. There can be no inducement to go nearer, as this place affords neither fuel nor water; and if incautiously approached, much trouble and danger may ensue from ledges of rocks, which exist at 3 miles, if not more, from the coast.

From Coy Inlet to Cape Fairweather the coast is similar to the former part, but more free from rocky ledges; and good anchorage may be found at from 2 to 6 miles off shore, in from 7 to 12 and 14 fathoms, muddy bottom; the water shoaling gradually to the shore. The beach is of shingle to high-water mark, and then of hard clay as far as 100 ft. beyond the low-water limit, where a green muddy bottom commences, and the water gradually deepens. The outer edge of the clay is bounded by a ledge of rocks, on which the sea breaks, extending outward for some distance parallel with the coast.

Hereabout the flood sets to the N.W. by N., and the ebb S.E. by S., six hours each way; high water, on full and change, between 9^h and 10^h. Vertical rise, 40 feet.

At about 17 miles North of Cape Fairweather, in lat. 51° 16′, is a ravine with a copious supply of fresh water, obtainable without difficulty with the wind off shore. It is much grown over with plants, and may not keep, though serviceable for a temporary supply.

CAPE FAIRWEATHER is the southern extremity of the long range of clay cliffs extending from Coy Inlet, almost without a break. The cape resembles very much Cape St. Vincent, on the coast of Portugal; it also bears a strong resemblance to Cape Virgins, to the southward, for which it has frequently been mistaken, although there is a difference of more than 45 miles in the latitude of the two headlands. The cliffs are of white soft clay, from 300 to 400 ft. high, and are horizontally stratified; the strata extending for many miles without interruption, and having the appearance of "chalk hills, like the coast of Kent."

The interior presents open plains of undulating country, covered with grass and plants, among which is abundance of wild thyme, but entirely destitute of trees; it abounds with guanacoes, which may be procured by lying in wait at the water holes. Fresh water may be seen trickling down the face of the cliffs at short intervals.

RIVER GALLEGOS.—Cape Fairweather forms the North side of the entrance of the River Gallegos. The South side is a low shore, not visible more than 12 to 15 miles off; but there are in the interior several hills, called the *Friars* (los Frayles), the *Convents*, and the *North Hill*. The river is fronted by extensive sand-banks, most of which may be crossed at high water, but at half ebb they are almost dry. The channel is within the southern extremity of the shoals, which bears from the southern bend of the cape S.E., 10 miles. The passage in is parallel with the coast on the South side, taking care not to open the land to the northward of the easternmost bend of Cape

Fairweather; which, when in the fairway, should bear N. 40° W. The shore on the port hand must then be gradually approached, and as the place is imperfectly known, it may be prudent to anchor in 4 fathoms, at 1½ mile from shore, in order to await low water, so soon as the South point is seen to trend round to the westward. Here the anchorage is good, and well sheltered from prevailing winds.

The banks at the entrance of this river have changed considerably since the survey made by Capt. Stokes in 1828; H.M.S. *Nassau*, in 1867, grounded in 8 ft. at low water, close to where 10 fathoms was marked on the chart. As, however, there is a rise and fall of tide of 46 ft. at springs, a vessel of moderate draught can always enter at half tide by keeping close round the southern point. No large vessel should attempt to go inside. The river has a mean velocity of 4 to 5 miles per hour.

The river extends 30 miles to the westward, and then winds southerly between two ranges of hills. Its banks are formed of downs, abounding with guanacoes and ostriches. The water is fresh at 25 miles from the mouth. In the entrance the time of high water, full and change, is $8^h 50^m$. Vertical rise, 46 ft.; velocity, 5 miles an hour.

CAPE VIRGINS.—This cape is a steep cliff, about 150 ft. high, in lat. 52° 18′ 35″, long. 68° 17′ 30″. It is the southern extremity of the Patagonian coast, and the North side of the entrance of the Strait of Magalhaens. From the South side of the River Gallegos the coast towards Cape Virgins trends in a south-easterly direction, and for the first half of the distance is so low and shelving as not to be visible a few leagues off. In clear weather it is visible from 20 to 25 miles, and when made from the northward, it will appear as an extreme of land between the bearings of S.S.E. and W.S.W.; Dungeness Spit will not be visible until much nearer. To the southward of W.S.W., Mount Dinero will show as a small nipple opening clear of it. Should a vessel from the northward find the wind so strong as to prevent her proceeding, an anchorage, quite sheltered from westerly winds, will be found to the northward of the cape.

The cape, as before stated, is much like Cape Fairweather. Capt. King says: "At daylight the land was in sight, terminating in a point to the S.W., so exactly like the descriptions of Cape Virgins, and the view of it in Anson's Voyage, that without considering our place on the chart, or calculating the previous twenty-four hours' run, it was taken for the cape itself; and no one suspecting a mistake, thought of verifying the ship's position. The point, however, proved to be Cape Fairweather. It was not a little singular that the same mistake should have been made on board the *Beagle*, where the error was not discovered for three days. A similar error was made by one of the ships of the fleet, under Loyosa, in 1525."

The marks, in clear weather, by which it may be known, are the Friars and other hills before mentioned; and in thick weather the soundings, on approaching, will be a certain guide; for at the distance of 4 miles off to north-eastward no more than 6 or 7 fathoms will be found, whereas at that distance from Cape Virgins the depth is much greater. It is also to be noted that the bottom to the North of Cape Fairweather is of mud, while that to the North of Cape Virgins is of gravel or coarse sand, and the latter has a long, low point of shingle extending south-westward from it for nearly 5 miles; and lastly, if the weather be clear, the distant land of Tierra del Fuego will be visible to the S.S.W.

At 18 miles to the southward of Cape Fairweather cliffs commence, which extend thence to Cape Virgins, with the exception of one or two breaks only; in one of these, 8 miles North from Cape Virgins, there may be landing for a boat. There is good anchorage, generally, all along the coast, at from 2 to 5 miles off shore; but the bottom is rather stony, and may injure hempen cables. As the cape is approached the ground becomes more foul.

Virgin Reef, which at half tide is scarcely observable, dries nearly a mile E. by N. from the cape. There is 4 to 5 fathoms close outside it, but it is not advisable to pass very close, as the height of the cape makes it difficult to judge exactly the distance from the shore.

It has been proposed to establish a *fixed bright* light on Cape Virgins.

SARMIENTO BANK, taking 10 fathoms as its limit, extends from Cape Virgins 20 miles to the S.S.E., its outer edge following the line of coast from the northward, and being kept in that line by the rapid current which sweeps along it. The extreme breadth of the bank at right angles to its general line of direction is about 5 miles, and the widest part is 8 miles from the cape; the shoalest water on it, excepting Nassau Rock, is 3 fathoms, lying 3 miles S.E. from Cape Virgins, or 4½ miles N.E. ¾ E. from the end of Dungeness Spit.

Nassau Rock, on which H.M.S. *Nassau* struck in January, 1868, while sounding on the bank, lies E. by S. 3½ miles from Cape Virgins. It is a small pinnacle, with only 3 ft. at low-water springs, and 3 to 6 fathoms close to. There is a little kelp on the rock, but not enough to mark it, and, except in a gale, the sea does not break until nearly low water.

Dungeness, like the point of the same name in England, is steep-to, having 20 fathoms close to the Ness. A triangular pyramidal *beacon*, 40 ft. high, painted in red and black bands is placed about 150 yards from high-water mark, and is visible about 12 miles.

There is good anchorage on both sides of Dungeness Spit, which is steep-to, and convenient for vessels bound either way, to await a change of wind or tide, or to stop at night. The bottom is stiff blue mud, which on the East side is thinly overlaid with stones.

Zealous Anchorage, on the West side, is perhaps the best, as the curve of the spit enables a vessel to anchor well under the North shore, and consequently out of the strength of the tide. This anchorage will be found most convenient for a vessel bound eastward meeting with an easterly wind, to await the shift to the westward. H.M.S. *Zealous*, an ironclad of 4,000 tons, took advantage of this anchorage, in March, 1867.

In strong south-westerly winds it would be best to anchor under the lee, on the eastern side, where, though the squalls come very hard across the spit, there is no sea until the wind draws southward of S.S.W., when it becomes a leading wind into Possession Bay. The best anchorage outside the spit is in 9 or 10 fathoms water, with the Ness bearing S.W. ½ S., distant about 2 miles, and Cape Virgins N. ½ E. The anchoring ground extends much farther to the north-eastward, but as all westerly gales draw to S.W. before dying away, it is better, if possible, to be to windward, and so, in case of the cable parting, to be able to weather the 3-fathoms patch, and pass on either side of Nassau Rock.

STRAIT OF MAGALHAENS.—At the distance of 5½ miles to the south-westward of Cape Virgins is a low, shingly point, now called *Dungeness*: and at 20 miles westward from Dungeness is the cliff, 300 ft. in height, called *Cape Possession*. The last forms the eastern side of a shoal bay, which, under the name of *Possession Bay*, extends thence 22½ miles to the westward, where the *First Narrow* of the strait commences.

The best route to the strait is to pass over the Sarmiento Bank, which can be done with perfect safety between half flood and half ebb, but care must be taken to keep 1½ mile off Cape Virgins, to avoid the Virgin Reef, and not more than 2½ miles off, unless it is intended to pass southward of Nassau Rock. Approaching from the eastward, or in a large vessel, it will be better to go to the southward of this danger, as the water gradually deepens in proceeding. At low water a large vessel should not cross within 10 miles of Cape Virgins, beyond which distance the soundings will be more regular than farther North.

Before entering the strait the tides should be carefully considered, as on them will principally depend whether a good or bad passage to Sandy Point is made. An anchor might be dropped, if necessary, to wait for the tide on any part of the bank; but as it is quite exposed, and the holding ground indifferent, it would, if possible, be much better to get under Dungeness Spit. It has been proposed to establish steam-tugs to take vessels through the straits.

In our "Directory for the Navigation of the South Pacific Ocean" is given a full description of the shores and harbours of the Strait of Magalhaens; with instructions for the passages through it from eastward and westward.

III.—THE COAST OF TIERRA DEL FUEGO TO CAPE HORN, ETC., INCLUDING STATEN ISLAND.

Tierra or Terra del Fuego has been repeatedly described by different navigators. It is a dreary country, distinguished by craggy mountains and barren isles. The inhabitants, wholly uncivilized, subsist on the flesh of seals and other gross substances; their dwellings are tents, rudely formed with poles, and covered with skins, or the bark of trees. A chain of stupendous rocks, extending through the greater part of the country, is continually covered with snow.

Captain Weddell, in his Narrative, says:—I would willingly, for the honour of human nature, raise these neglected people somewhat higher in the scale of intellectual estimation than they have reached; but I must acknowledge their condition to be that of the lowest of mankind. At this age of the world it appears almost incredible, and certainly disgraceful, that there should exist such a tractable people in almost pristine ignorance. These inhabitants have been spoken of as if they were beings possessed of little more than animal instinct, and incapable of instruction; but the captain adds, that he found them not only tractable and inoffensive, but also, in many of their employments, active, ingenious, and certainly capable of improvement by intercourse with strangers.

The stature of the people is generally low; but the contour of their faces, and the form of their heads, are those which are found to be peculiar to most Indians. They have flat noses, small eyes, full and well-formed chests, small arms, legs small and ill-shaped. The women are better featured than the men. The only clothing the male wears is a skin over their shoulders, reaching a little more than halfway down the back; some have not even this sorry garment. The women have generally a larger skin over their shoulders, and are, in other respects, clothed as decency requires; and even the youngest of their female children have the same covering, which evinces a degree of modesty seldom found amongst untutored people.

The STRAIT of LE MAIRE, between Tierra del Fuego and Staten Island, was so named after the navigator who discovered it in 1616. It is said, in the relation of Anson's Voyage, that it is difficult to determine exactly where the strait lies, though the appearance of Tierra del Fuego be well known, without knowing also the appearance of Staten Land; and that some navigators have been deceived by three hills on Staten Island, which have been mistaken for the *Three Brothers* on Tierra del Fuego, and so overshot the strait. But Captain Cook says that no ship that coasts Tierra del Fuego within sight of land can possibly miss the strait, for it will then of itself be sufficiently conspicuous; and Staten Land, which forms the eastern side, will be still more manifestly distinguished, for there is no land on Tierra del Fuego like it. The Strait of Le Maire can be missed only by standing too far to the eastward, without keeping the land of Tierra del Fuego in sight; if this be done, it may be missed, however accurately the appearance of the coast of Staten Island may have been exhibited; and, if this be not done, it cannot be missed, though the appearance of that coast be not known. The entrance of the strait should not be attempted but with a fair wind and moderate weather, and upon the very beginning of the tide of flood, which happens here, at the full and change of the moon, about 1^h. It is always best to keep as near to the Tierra del Fuego shore as the winds will admit. By attending to these particulars, a ship might get quite through the strait in one tide; or, at least, to the southward of *Success Bay*, into which it would be more prudent to put, if the wind should be southerly, than to attempt the weathering of Staten Land with a wind and lee current, which may endanger her being driven on that island.

Mr. J. M. Gray, commanding the British barque *Shun Lee*, from long experience recommends that sailing vessels coming from the northward should not attempt to enter the strait until 1 hour after high water. He states that it is his practice on arriving near the strait to wait 5 or 6 miles to the northward, until a little after high water. Also that in March, 1881, he entered the strait at that time of tide, and although it was blowing a gale from the S.W. the ship drove through rapidly.

STATEN ISLAND, which was surveyed in 1828, by Lieut. E. N. Kendall, of H.M.S. *Chanticleer*, is 38 miles in extent from Cape St. John to the E.N.E. to Cape St. Bartholomew to the W.S.W. The island is described as extremely mountainous and rugged, being composed of a series of lofty, precipitous hills (2,000 ft. and some 3,000 ft. in height), clothed nearly to their snowy tops with forests of evergreen beech trees, the laurel-like winter's bark, and the holly-leaved barberry. These are all evergreens; besides, there is a host of minor plants. The low ground is extremely swampy and boggy, in many parts a perfect quagmire. The writer of this description says, that the cold of these regions is a fable, and at variance with truth and nature. At Cape Horn, in lat. 56° S., vegetation was in full vigour in May, or the November of their year, and snow rarely lies upon the low grounds. In fact, we have sufficient matter to elucidate the climate of the South, and to establish its comparative mildness with the North, especially if America be taken as the example. The summers of the South are by no means warm or hot, nor winters cold; but to compensate for this, it is the region of wind, storms and rains, perpetual gales, and eternal rains; never twenty-four hours without rain. It is the court of Æolus. The barometric pressure is low, the mean being 29·32 inches; magnetic intensity low,—the winds almost always westerly; electric phenomena extremely rare. These are the outlines of the climate, to which great attention was paid on board the *Chanticleer*, with the best possible instruments.

Captain Morrell, on passing between Queen Catherine's Foreland and Cape St. Sebastian,—the latter in lat. 53° 26′, long. 67° 57′,—remarks, that thick and wet weather is very uncommon on that part of the coast. The Cape of St. Inez is in lat. 54° 8′, long. 66° 57′ 45″, and is a very remarkable part of the coast, from the appearance of a table land, which is commonly made by those bound round to Cape Horn. Between Cape St. Sebastian and Cape St. Inez the shore is generally rocky, and dangerous to approach in the night.

HARBOURS, &c., of STATEN ISLAND.—Off the North side of Staten Island is the group of islets called *New Year Isles*, lying between long. 64° 3′ and long. 64° 13′, and the northernmost in lat. 54° 39½′. To the S.E. by S. [*S. by E.*] from the latter is an inlet named *New Year Harbour*, about half a mile broad, and extending 3 miles to the S.W., and having the depths of 30 to 45 and 20 fathoms. A cluster of islets lie in the entrance, and the passage in is on the eastern side. Captain Morrell says, that here you may have any depth of water from 30 fathoms to 5 fathoms, with a bottom of mud and sand. Its shores abound with wood and fresh water. Scale fish of various sorts may be caught with hook and line, and sea fowl shot in several directions. Fresh, green celery in its season can be had in any quantity, together with some berries of an agreeable flavour.

Next to New Year Harbour, at 1½ mile to the East, is *Port Cook*, a smaller inlet, wherein the late Captain Foster erected his observatory. It is surrounded by very high land, a mountain on its western side being 2,070 ft. in height above the level of the sea. The entrance is very narrow, and has a depth of only 6 fathoms, but within the depth increases to 16 and 20 fathoms. Lieut. Kendall, in his memoir on Staten Island, states that this is decidedly the harbour most eligible for a ship in want of shelter, from the considerations of its affording good anchorage at its entrance, in not too deep water, the greater regularity of the prevailing winds, and the facility of communication with the South side of the island, by means of a low isthmus separating it from *Port Vancouver*, a shoal inlet on that side.

Cape St. John is the easternmost point of Staten Island. It is high and precipitous, and a heavy tide rip extends from it 5 or 6 miles to seaward, setting at the rate of 6 miles an hour, to the N.N.E. with the flood, and to the S.S.E. with the ebb; but the tide sets along shore, both on the North and South, from East to West, from 3½ or 4 to 2 or 2½ miles an hour. Off Cape St. Bartholomew, the S.W. point of the island, the tide-rip, with the flood, sets to the S.W., 5 or 6 miles an hour. This tide-rip likewise is very heavy, and extends 5 or 6 miles to seaward.

St. John's Harbour lies within the promontory of St. John, on the West. It is free from danger, surrounded by high land, and its general depths are from 25 to 20 fathoms, decreasing toward either shore. From the entrance the harbour curves in a S.W. direction to the extent of 3½ miles, but is little more than half a mile broad. The hills of the promontory, on its eastern side, are 800 or 900 ft. in height, and at its head on the S.W. is a remarkable elevation, now known as *Mount Richardson.*

Lieut. Kendall has described this harbour, and says that it may be easily recognized at a distance by Mount Richardson. On nearing it, a remarkable cliff, like a painter's muller, appears on the eastern shore, which is high and steep. Allowance must be made, in steering, for the set of the tide, which at all times runs rapidly across the mouth of the harbour; it is, however, less sensible when within the headlands forming the N.W. bay, in which, in case of necessity, or to await the turn of the tide, an anchor may be dropped in from 20 to 30 fathoms. The mouth of the harbour is wide, having 25 fathoms in the centre, with a rock standing off at some distance from the western point, to which a berth must be given. The shores, with this exception, are bold; and immediately within the western point is a small bay, where anchorage may be had in 10 fathoms. The most sheltered situation is at the head of the harbour, 3 miles S.S.W. from the entrance, where any depth may be chosen between 20 and 5 fathoms, with sandy bottom, and moor with an open hawse to the S.W., from whence the gusts that come from the mountains are violent. The wind, anything to the westward of W.N.W., or even N.W. outside, will be found to draw out of the harbour on nearing its head; and if at all strong it will be impossible to beat farther, as it follows the direction imparted to it by every ravine in the hill as it passes; and, therefore, warping will be found the only means of advancement, taking care to have hands by a bower anchor ready to let go, and the cable stoppered at a short scope, in the event of the hawsers being carried away. A ship may readily heave down on a beach of sand at the head of the harbour.

Wood and water are plentiful, and easily procured; celery and wild fowl (race-horse or steamer ducks, kelp and upland geese), may also be obtained; and in the proper season, October, a good supply of penguins' eggs may be insured by having men in attendance at a *rookery* about a mile to the eastward of the harbour's mouth, whither they could walk along the eastern hills, from the vicinity of the *Painter's Muller*, and remain to collect daily the eggs as deposited, and secure them until a favourable opportunity is offered of embarking them from the foot of the cliff on which the rookery is established.

The shores of St. John's Harbour are lined with kelp, which is an excellent indication of its navigable part, the border of it being almost invariably in 8 fathoms, and that close to the shore, the depth rapidly increasing toward the centre, until near the head of the harbour, where the depth gradually decreases to the beach.

Westward of Cape Colnett, or the meridian of 64° 16′, are the small harbours named *Port Parry* and *Port Hoppner*; and within New Year Isles, to the West of New Year Harbour, is another, *Port Basil Hall*. These are of inferior consideration, but have been described by Lieut. Kendall, as given in the Appendix to Mr. Webster's Narrative, before noticed.

To the southward of Staten Island but little amount of tide is perceptible; there is, however, a remarkable undertow, which renders it dangerous for boats to stretch across the mouths of the deep bays, as it is difficult to close again with the land, for which reason the sealers invariably follow the circuitous route of the shores.

Mr. Webster, in his copious description of the vegetable productions of Staten Island, has noticed the vast masses of seaweed which entangle the shores. The sea teems with them, especially in the rough and open bays, while they are comparatively rare in the still, sequestered creeks. Did they increase in the calm harbours as upon the rougher shores, they would be choked up; and they would form an impervious mesh of cords. But they thrive best in the boisterous element; and where it would seem impossible to obtain a hold, there they grow and gather strength to meet the storms.

Many pages might be justly devoted to the plants of the sea. Here they are gigantic in form, some being 300 ft. in length; some of immense strength and sturdy stems, and becoming, as it were, oaks in the sea; others again spread their tough and leathery substance like hides, so that buckets, bowls, and cups may readily be made of it. Some form ropes and cables to moor boats with; some yield a jelly pure and tasteless, like isinglass, far exceeding that of the *fucus crispus*, or Carrageen moss of our shores; and it is added that amid the vast forests of seaweed, here described, multitudes of curious specimens may be obtained.

ON THE WESTERN SIDE OF THE STRAIT OF LE MAIRE are the Capes of *St. Vincent*, of *St. Diego*, and *Good Success;* and near the middle of the strait, between the Capes of St. Diego and Good Success, is *Success Bay*, which has been already mentioned. Cape St. Diego, the north-easternmost of the three capes, lies in lat. 54° 40′ 35″, long. 65° 2½′. It is low, but a ship may go close to it. There are shoaler soundings toward the East, for about 2 miles, than in any other parts hereabout; for a rocky ledge, under water, seems to project from the cape. On this ledge are overfalls, strong eddies, and a violent race of tide when the wind is opposed to it, which is dangerous to small vessels.

Capt. E. Kluge, of the barque *Epsilon*, reports that he touched the ground in the straits, Cape San Diego bearing N.W., distant about 6 miles; sea smooth. When in dock, on arrival at Swansea, the copper on the vessel's keel was found to be slightly injured.

Cape St. Vincent, to the westward of Cape St. Diego, is a rocky point with low bluffs above it. Between it and Cape St. Diego is *Thetis Bay*, a tolerable anchorage during West and southerly winds, though the bottom is rocky in many places. Between the heads the tides run with great strength; therefore a ship should anchor off a green bluff at the West side, and within the line of the heads, where she will have from 6 to 12 fathoms of water, over a coarse sandy bottom, mixed with patches of rock.

Beyond Cape St. Vincent the land trends to the West and N.W.; it is rather low near the sea, but within are many hills, partially covered with wood. Regular soundings extend to seaward for many leagues; and good anchorage may be found near the land, or on any part of this coast during westerly winds.

Jaseur Reef, on the eastern side of the strait, about 3 miles West from the middle cape of Staten Island, will be noticed hereafter.

Cape of Good Success, in lat. 54° 55′, is the S.E. point of Tierra del Fuego. It is high and bluff, and some rocks lie close to it, above water. To the W.N.W. of it is the *Campana*, or *Bell Mountain*, which is seen far off at sea, from the North as well as from the South. It is high, and takes its name from its resemblance to a large bell.

Rather more than 2 miles north-eastward of Cape Success is a projecting headland, which at first appears to be the Cape. Two rocky islets show themselves close to it, and from a distance appear like a ship under sail. At 6 miles N. ¾ E. from these rocks is *Good Success Bay*, which is visible from the northern entrance of the strait.

The Bay of Good Success is the place within which, in the year 1769, Mr. Banks and Dr. Solander found the cold so intense, that the latter nearly fell a sacrifice to its severity, though in the midst of summer. Dr. Solander, who had more than once crossed the mountains which divide Sweden from Norway, well knew that extreme cold, especially when joined with fatigue, produces a torpor and sleepiness which are almost irresistible; he therefore conjured the company to keep moving, whatever pain it might cost them, and whatever relief might be promised by an inclination to rest: "Whoever sits down," said he, "will sleep; and whoever sleeps will wake no more." The doctor, who gave this advice, was the first who yielded to the sensation which he had described; but, by exertion, he was saved; two other persons perished.

Good Success Bay is an excellent anchorage for vessels of any size to stop in for wood or water; but it would not answer if a vessel required to lie steady for repair, as a swell frequently rolls in. It is quite safe; yet in the winter season, when easterly gales are common, no vessel should anchor so near the head of the bay as she might in summer; for heavy rollers at times, though rarely, set in. Fish we did not try to get, not having any spare time, and only a few birds were shot.

The soundings are tolerably regular, and may give notice of an approach to Staten Land, or to the N.E. coast, and may guide a ship to the fairway of the strait; but I should not place much confidence in them, near such a rocky coast as that of Staten Land.

This bay is about 2 miles wide, and extends into the land, westwardly, 2¼ miles. It may be easily known by a peculiar mark or feature on its southern side, resembling a broad turnpike road extending into the country from the shore. The anchorage is good all over it, in from 4 to 12 fathoms of water, clear ground. Here a vessel lies perfectly safe, provided she does not anchor too far in toward the sandy beach at its head; for during S.E. gales a heavy swell, with dangerous rollers, sets right into the bay. Elevated lands, of about

1,200 ft. above the level of the sea, surround the bay; therefore, with strong winds, it is subject to squalls, which, during westerly gales, are very violent.

The eastern side of the Strait of Le Maire, already noticed, is formed by the very irregular bays and rugged capes of Staten Island. Surrounding the latter are heavy tide rips, which extend outward to a considerable distance, and render a near approach very dangerous. The *Middle Cape* lies in lat. 54° 48′ 20″, long. 64° 42′ 30″. This, with *Cape St. Anthony*, the N.W. cape, and *Cape St. Bartholomew*, the S.W. cape, are high, bluff promontories.

The soundings in the strait are regular near the southern entrance, 70 to 30 fathoms, over a sandy bottom. Toward the North the soundings diminish; and 2 miles off Cape St. Diego there is not more than 30 fathoms, over rocky bottom. The strait is generally clear, excepting a reef discovered by Captain E. Handfield, in passing through in H.M. sloop *Jaseur*, in 1827, which lies at about 3 miles West from the Middle Cape. It appeared to be about 1½ mile in extent, and the sea broke violently on it.

The Tides of Good Success Bay and the Strait of Le Maire are as regular and as little to be dreaded as in any part of the world where they run with strength. They will materially assist any vessel in her passage through the strait, which is very wide, perfectly free from obstacles of any kind, and has Good Success Bay close at hand, in case wind or tide should fail. When the tide opposes the wind and swell, there is always a heavy, and for small vessels, dangerous "race" off Cape San Diego; in one spot, where the water is more shoal than elsewhere, 5 fathoms only was subsequently found at a neap flood tide; but let it be remembered, that on another day, at the top of the springs, being the day after full moon, we passed the same spot, at half flood, with the water perfectly smooth; and although strong eddies were seen in every direction, the vessel's steerage was but little affected by them. It is high water in Good Success Bay soon after 4 p.m. on the full and change days, and low water at 10 a.m. The flood tide stream begins to make to the northward about an hour after low water, and the ebb to the southward about the same time after high water. The tides rise from 6 to 8 ft. perpendicularly.

At Cape Pillar the turn of the tide, with high water, is at noon; but along the S.W. and S.E. coast the time gradually increases to this coast. From Cape San Diego the flood tide sets North and West along the shore, from 1 to 3 knots per hour, as far as 20 miles along the shore, and the ebb in a contrary direction, but not so strong, except in San Vincente Bay. The flood in the Strait of Le Maire runs about 2 knots in mid-channel, more or less according to the wind, and the ebb about 1 knot an hour. Perhaps at times, when a strong spring tide is retarded in its progress by a northerly wind, there will be a dangerous over-fall off Cape San Diego, like the bores in some parts of the world.

FROM THE STRAIT OF LE MAIRE TO CAPE HORN, ETC.

From *Cape Good Success* the coast of Tierra del Fuego trends westward to a small bay, called *Acquirre Bay*, in long. 65° 44′, a place fit only for temporary anchorage during northerly or westerly winds; but under *New Island*, to the S.W. from this place, good temporary anchorage during westerly winds may be obtained. To the southward of New Island is the smaller isle, called *Evout Island*, the centre of which is now represented in lat. 55° 33′, long. 66° 41′.

The centre of a low, rocky group, called *Barneveldt Isles*, is in lat. 55° 48′ 54″, long. 66° 40′ 20″. These are surrounded by deep water, but ships should always keep to the eastward of them, as there may be dangers, yet unknown, on the West. Nothing but a little grass grows on the larger islet.

CAPE HORN (properly *Hoorn*, after the town of that name in North Holland), is the southernmost point or headland of a group called *Hermite Islands*. A representation of it is given on the chart. The name of these isles was imparted from that of Admiral Hermite, commander of the Dutch fleet, who visited this coast in 1624. Capt. Cook, in his passage in December, 1774, brought Cape Horn to bear E. by S., and says it is known, at a distance, by a high, round hill over it. A point to the N.W. shows a surface not unlike this; but their situation alone will always distinguish the one from the other. Capt. Cook gave the situation of the cape as 55° 58′ S., and 67° 13′ W., from his observations made in 1769; but he adds that his subsequent observations placed it in 67° 19′, which, it may be seen, is not so correct. On the N.W. side of the cape are two peaked rocks, like sugar-loaves, lying N.W. by N. and S.E. by S. *(by compass)* from each other. Some other straggling low rocks lie West of the cape, and one South of it, but they are all near the shore.

In the direction of E.N.E., 9 miles from Cape Horn, is *Cape Enganno*, the *Mistaken Cape* of Capt. Cook. It is a rocky point, and the southern point of the easternmost of the Hermite Isles, now distinguished by the name of *Wollaston*.* Capt. Cook has said—"In some charts Cape Horn is laid down as belonging to a small island. This was neither confirmed, nor can it be contradicted, by us; for several breakers appeared on the coast, both to the East and West of it, and the hazy weather rendered every object indistinct. The summits of some of the hills were rocky, but the sides and valleys seemed covered with a green turf, and wooded in tufts."

Capt. King says that there is nothing very striking in the appearance of Cape Horn, as seen from a distance; but, in passing near, it is more remarkable, showing high black cliffs towards the South. It is about 500 ft. high above the sea, in lat. 55° 58′, long. 67° 13′.

One mile to the westward of Cape Horn are three rocks, generally above water, and over which the sea always breaks.

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* Strangers should be careful not to mistake this cape for Cape Horn; for such mistakes have occurred, as the name imports. Off the cape are several rocks, all above water, and at 2 miles to the S E. is a cluster rising 30 or 40 ft. above the sea.

Wigwam or St. Martin's Cove, on the eastern side of Hermite Island, westward of Cape Horn, has been described by Capt. Foster, who states that it bears from the cape W. by N. ¼ N. about 10 miles, and is a place of easy access with N.E., East, and S.E. winds. It is open to the East, and may be readily found by means of *Chanticleer Island*, which lies about a mile *true* East from the South head of the entrance. With westerly winds, which are adverse and prevalent, vessels should anchor off the entrance, in about 22 fathoms, and warp into the cove, where there is a convenient berth in 18 fathoms, sandy bottom, midway from either side, and about half a mile from the head of the cove. This anchorage is safe, although the gusts of wind in westerly gales, which are of frequent occurrence at all seasons of the year, rush down the sides of the mountains in various directions with impetuous violence, and may be very properly called *hurricane squalls*. They strike the ship from aloft, and have more the effect of heeling the vessel than of bringing a strain upon the anchors, which, when once imbedded in the sandy bottom, hold remarkably well, and will cost a heavy heave in weighing.

Wood and water abound in every part of the cove, but cannot always be procured, from the steepness of the shores, and the heavy swell that sometimes sets in. The water is highly coloured by the vegetable matter through which it percolates; but no other inconvenience from its use was found than that of imparting to tea a deeper colour, and somewhat unpleasant flavour. The wood was very much twisted and stunted in growth, and did not seem fit for any other purpose than fuel.

The shores of the cove are skirted with kelp, which serves to protect the boats in landing, and amongst which fish also are to be caught with a hook and line, abreast of the rills of fresh water that discharge themselves into the sea. From the natives was obtained a knowledge of this most valuable supply, by observing them in the act of fishing, which is ingenious: they have a line, and to the end is fastened a limpet, which the fish eagerly swallow, and not being able whilst in the water to disgorge it, are thereby drawn to the surface, and taken by the hand. In this manner they have been known to catch several dozen in the course of a few hours; but I am induced to believe that it is only in the summer months of these regions that supplies of so salutary a nature can be procured. The wild fowl that are most palatable consist of geese and race horses, called steamers by the sealers. Both sorts are well tasted, and were found agreeable. They were generally seen among the kelp in the cove about daybreak, but soon afterward would depart for their daily places of resort.

At the head of the cove, and a few feet beyond the reach of high water, spring tides, abundance of celery is to be found, as also in many other places in the cove. During two months of the latter part of the autumnal season a sufficiency was daily procured for the use of the ship's company; and although of not so luxuriant a growth as in December, it was, nevertheless, considered wholesome. Lat. 55° 51′ 20″, long. 67° 31′. High water, on full and change, at $3^h\ 50^m$; the rise about 8 ft. It appeared that the flood came in from the southward.

DIEGO RAMIREZ ISLES, discovered in 1619, are a cluster of great, barren rocks, 54 miles south-westward from Cape Horn, which extend N.W. and S.E., 4 or 5 miles. The channel between is entirely clear. The position of the centre, according to Capt. King, &c., is lat. 56° 24′ 30″, long. 68° 37′.

There are three principal isles, and many rocks above water. The appearance of them is given on our chart. The centre isle is the largest; it has tussac upon it, but neither wood nor water. It is frequented by various oceanic birds. The second in size has a single beach, where a boat may be hauled up in safety; and there is enough good water on the East side of the same island to supply thirty men. A furious surf breaks on the West shore, and sends a spray over the whole island. There is no sheltered anchorage for a vessel. The westernmost rock is the highest, and is surrounded by several small rocks, sufficiently elevated for birds and seals. Around the rocks the water is bold within a cable's length; and in clear weather a ship may safely run for them in the night, by keeping a good look-out. The highest point is about 200 ft. above the sea. They are quite similar to the Ildefonsos, the top of a ridge of hills showing above the water, and broken through by the sea.

On the East side is a depth of 30 fathoms, with a bottom of fine green sand. The tide of flood here runs to the N.E., and apparently to the eastward, among many of the main islands.

Capt. Colnett says that in general the birds hereabout resemble the dun crow, common in Hampshire in the winter, and which has been seen daily from the parallel of the Falkland Islands.

ISLES of ST. ILDEFONSO.—These are a group of rugged islets and rocks above water, bold-to, and within which Capt. Cook passed to the eastward in December, 1774. They extend 5 miles in a N.W. and S.E. direction, are very narrow, and about 100 ft. high above the level of the sea. They have been much frequented by the sealers. Their distance from the nearest point of the main is about 20 miles, and their position is lat. 55° 51′, long. 69° 11′. The passage between them and Diego Ramirez is 35 miles wide, and entirely free from danger.

Capt. Weddell says that the largest isle is not more than a quarter of a mile long. On a N.W. or S.E. bearing the whole appears as two isles only; but the northern one is merely a cluster of detached rocks; the southern islet is the largest and highest, and contains a quantity of tussac on its top; and sea gull rookeries. The isles have no beaches, and can be landed on only when the water is very smooth. Between them is a channel of a mile wide, which, being rocky, should not be used.

General Remarks on the Passage along the Eastern Coast of Patagonia, and around Cape Horn.

We here give a *résumé* of the principal instructions of the most distinguished authors; and, in doing so, first quote from King and FitzRoy.

Captain King advises vessels to keep well off shore when doubling Staten Island. He thinks it would be imprudent to attempt the Straits of Le Maire with southerly winds; because, when the tide sets to windward, the sea becomes very heavy across it, and may seriously endanger small vessels, whilst it is sufficient to cause rather heavy damages to larger ones. In calm weather it will be still more dangerous to be caught in the straits, as the currents set toward Staten Island; and, consequently, it may become necessary to anchor, and this can only be done in very deep water, and then quite close to the shore. But, with northerly winds, this route gains so much to the westward that it will rarely be avoided; however, it is always doubtful whether northerly winds, unless they are very strong, will blow through the whole length of the straits; and, if they die out, there is great danger of being driven on to the eastern shore. Capt. FitzRoy seems to think there is no danger whatever in taking the Straits of Le Maire. The principal danger, if there is any, is that the winds may die out.

When it is decided to pass to leeward of Staten Island, a lookout must be kept for the tide-race, which extends for a long distance off Cape St. John on the N.E. extremity of the island. There are no other dangers, however, to be feared. The passage by Nassau Bay cannot be recommended.

After having doubled the island to the eastward, if the wind blows from nearer South than S.S.W., the port tack should be taken; but if it blows from the westward, the starboard tack should be taken, and a course may be run as far as 60° S. That tack which makes the most westing should then be taken. After having arrived at the meridian of Cape Pillar, or of 75° W., every effort to make on the route should still be continued as far as 83° or 84° W.; this will then allow northing to be made in spite of the N.W. winds, which prevail between 50° and 54° S.

With regard to the best time of the year for rounding Cape Horn, Captain King, in spite of the advantage of longer days in the southern summer, thinks it preferable to make the passage during the southern winter. According to him, the East and North winds are frequent in that season, while West and South winds prevail in summer. Further, the winds are moderate in winter, when compared with the furious summer gales.

In the same instructions the following observations may be found:—

"The equinoctial months, particularly March, are the very worst, and the gales of wind very violent. August, September, and October, are the coldest; rain, snow, and sleet. December, January, and February, are the warmest, the days are longest, and sometimes the weather is quite fine; but the westerly winds are more frequent, at times very strong, and accompanied by heavy rains. In April, May, and June, there is less bad weather than at any other season; easterly winds are frequent, and now and then bring rather steady fine weather. June and July resemble each other very much, but the heavy easterly winds are more frequent in July. The conclusion is that the months of June and July, although very cold, and in spite of the shortness of the days, are perhaps the most favourable for doubling Cape Horn from East to West; the months of April and May are also rather favourable for making the same voyage. Finally, the months of December and January are the best for making the passage when returning from the Pacific."

Capt. J. Weddell, R.N., says:—"March and April are the worst months in which to double the Horn from East to West. On the contrary, the passage will be quite easy from the 1st of November to the 15th of February, the period in which the winds do not often blow from the westward. From the 20th of February to about the 15th of May, there are very violent winds from N.W. to S.W.; consequently, it is almost impossible to double the cape, at least without running great risks, in a light-built vessel, or one that is but a medium sailer. From the 15th of May to the last of June, the winds predominate from the eastward, with fine weather. The cape may be doubled, at this season, by passing in sight of Diego Ramirez. In July, August, September, and October, the winds are from N.W. to S.W., and tempests are frequent in August and September."

Captain Weddell also advises taking the Straits of Le Maire in summer, because it shortens the route some 50 or 60 miles, and because they may be taken without danger, provided there is a certainty of having daylight enough to get out in case of encountering head winds at the southern extremity. When leaving the straits, the route should be to the southward to pass around the Horn; then coast along to the westward, and pass to the southward of Diego Ramirez Island, at a distance of a few miles. In summer, when working to the westward, vessels should get near the coast of Tierra del Fuego in the evening, because the wind frequently hauls to the northward at night, and to the westward again in the morning.

In the bad-weather months, March, August, and September, according to Weddell, Anson, and King, it is necessary to stand to the southward to 60° S. latitude, where the sea will be more regular, and the winds more steady, both in force and direction.

Captain King advises vessels bound for the Pacific to keep close along the East coast of Patagonia, at a distance of 100 miles. Captain FitzRoy is of a slightly different opinion. It is true, he says, that the sea is much smoother near the land, and that there is less fear of ice than farther off shore; but nevertheless, as the currents set to the northward with much greater force in-shore, it is better for large and well-constructed vessels to remain farther seaward.

In regard to doubling the cape Captain FitzRoy thinks that, instead of descending to 60° S., as Captain King recommends, it is preferable to beat near Tierra del Fuego, toward the Bay of Nassau; he advises, in case of heavy weather, to anchor in the Bay of Orange, under Noire Island, in Euston Bay, and sometimes elsewhere, and to seize the first favourable occasion that presents itself to make a good course to the westward, as far as the meridian of 82° W.

Captain Beechey thinks, with Captain FitzRoy, that it is useless to run to the southward in order to double Cape Horn. He only recommends taking that tack which gains most to the westward, by working within 60 miles to the southward of the cape. With the winds from S.W. a course should be made to the N.W., and with those from N.W., one to the S.W.; finally, if the two tacks are equally unfavourable, the southern tack should be taken, at least if a high latitude shall not have already been reached. In all cases great care should be used not to approach the coast to the eastward of the Horn, on account of the danger incurred by the velocity of the current across the Straits of Le Maire, and particularly with southerly winds. To the westward of Diego Ramirez Island the shore may be approached with impunity to within 40 or 60 miles.

Captain Weddell also advises going as far South as 60° in winter, and the rest of the time keeping near the land. Captain FitzRoy thinks the coast should be kept quite close aboard. Captain Beechey, in his turn, advises keeping away from the coast to the eastward of the Horn, but approaching it when to the westward of Diego Ramircz Island.

In the presence of these different opinions it is very difficult for the navigator to decide with which one to agree. In all cases, and no matter which route may be chosen, there will be some one in favour and some one against it.

We shall now revert to the instructions of Captain Maury:—To sum up, the best season for doubling Cape Horn, with regard to the time of passage, is from December to April inclusive; and the worst season is from June to November. This is the result obtained by Captain Maury, from a mean of 220 passages, and may therefore be regarded as absolutely correct, and as going far beyond the speculations of a single navigator who reasons from what has been experienced in about a dozen voyages at most.

These irrefutable results of the averages as made by Captain Maury, almost completely destroy the opinion or advice as given by Captain King, in which he says that the months of April, May, June, and July, are the most favourable for doubling the cape; on the contrary, they seem to confirm the views of Captain Weddell, which have already been given.

Directions by Captain Maury.—We shall finish our quotations by giving the advice of Captain Maury, which has the very great advantage of being based on a large number of observations:—

"The rule will be to always pass to the westward and in-shore of the Falklands. Take the Straits of Le Maire, if it is possible to get through them in the daytime, because the currents in them are singularly strong and variable; then pass along as close to the cape as the winds and rocks will permit. But if, after passing the straits and before getting around the cape, the winds are found strong from the westward, it will be preferable to stand to the southward instead of beating near the land, in order to find lighter winds, which will probably be found some distance off shore. However, even in such a case, care should be taken to profit by every variation of the wind, and, until the cape is doubled, to choose the tack which gives the greater westing. Vessels bound to Valparaiso or vicinity, should not, when to the southward of 50° S., make as much westing as those bound to California. These last may conveniently cross the parallel of 50° S., when they are close to the eastward of 100° or 110° W.; and they most frequently cross it between 80° and 90° W."

In the whole of the preceding there was but one thing positively determined, and that was the most favourable season of the year in which to make the quickest voyages. We have already said that the table of averages taken from Maury does not leave the slightest doubt on the subject. But we must add that nothing is proved in a positive manner, as to whether this is also the best time for the passages, when we have in view the gales and damages to shipping which must be encountered.

As for the route to be followed, we think the extraordinary diversity of opinion that exists on this subject makes it necessary to state the following as a principle: "*There is no absolute rule which will answer for this special navigation.*" Each navigator should follow his own calculations, according to the circumstances of wind and weather, and the qualities of the vessel he commands; and, finally, it is necessary to say, according to his own sailor-like qualities. We shall explain farther on what we mean by this expression.

In our opinion, the following will be about the notion derived by any reader from the various authorities quoted, and by a study of the pilot-charts of the prevailing winds in the locality of Cape Horn.

After having reached the parallel of 50° S., a line may be traced on the chart joining the position of the vessel and Cape San Diego (Straits of Le Maire); and then every endeavour should be made to keep to the westward of that line. In order to do this, since the winds prevail from N.W. and S.W., advantage should be taken of the N,W. winds to make a course of S.W. by S., or even S.W., true, in such a way as to gain a position well to windward, so as to be able to stand to the S.S.E. without inconvenience when the wind hauls to S.W. The worst season in which to make this fraction of the voyage is from the 1st of January to the 1st of April, as during this time the S.W. winds are the most frequent.

Upon reaching the vicinity of the Straits of Le Maire, in sailing vessels, no hesitation should be felt in taking it, provided the wind is strong and well established from the North, N.E., or N.W., the barometer steady, and the appearances indicate settled weather; and, finally, if one feels himself thoroughly acquainted with the working of his vessel. In all other cases, where any hesitation is felt, they must resign themselves to taking the outside route, doubling Staten Island, by passing a good long distance to the eastward of Cape St. John; in this way all fears may be laid aside, although the passage will be a little longer.

With fine auxiliary steamers, a corvette, for example, there is no excuse whatever for not taking the Straits of Le Maire, unless strong S.E. or S.W. winds are found at the entrance, or the weather has a very bad appearance.

At all times every possible effort should be made to pass through the straits in the daytime, on account of the violent and irregular currents against which one has to contend.

When leaving the straits, the route to be taken to double Cape Horn will be about S.W. Now, this will be easily made if one has the good fortune to have N.E. to N.W. winds, which, by the way, are not at all rare; and with them a good passage may be made, doubling the cape at a short distance from it. But if the winds are found to be West or S.W., what is then to be done? Capt. FitzRoy thinks it best to beat to windward close in-shore, taking advantage of every lull of wind and sea, and running for shelter, in case of very bad weather, into any of the different bays of Tierra del Fuego, which he has pointed out. In our opinion this is the only thing to be done in such a case, and in fact the only way in which quick passages can be made under such circumstances. But, on the other hand, we think no one should give instructions or advice in a general way which may at any given moment place a vessel in a very critical position. Captain FitzRoy, who, by the way, was perfectly acquainted with those localities, as he made a hydrographic survey of them, and with him officers familiar with the passage around Cape Horn, and particularly whalers and certain captains of merchant ships, have, all of them, run close in shore of the coast of Tierra del Fuego without the least hesitation, and have in that way made some very quick passages. In fact they have counselled and extolled that route. But since these instructions are written for captains who know little or nothing of the voyage they are to undertake, we think we should be taking a great responsibility on our shoulders were we to sustain the theory of Captain FitzRoy, and in that way to expose a sailing vessel to being carried in sight of Tierra del Fuego by S.W. winds, which might freshen up, and force her to seek shelter under a coast with which she is totally unacquainted. In other places nothing would be more natural; but in the localities of which we speak the case is very different. No buoys, no lights, no pilots, few detailed charts, and, above all, an exceedingly inhospitable coast, towards which the winds drive, and imperfectly-known currents are setting; without counting that there is nothing to be found there in the way of provisions, or for repair in case of sustaining damages.

This, in our opinion, would be the thoughts of an officer who had never doubled the cape, and who was given the command of a sailing vessel about to make that voyage. Some captains, either upon the spur of the moment, or after a previous voyage in which they have been irresolute, may take upon themselves to follow the route as given by Captain FitzRoy. It is a question of what we have before referred to as sailor-like qualities.

We think, then, that sailing vessels, finding the wind at S.W. when leaving the straits, should generally take the starboard tack. If the vessel is an auxiliary steamer, she may at first make a good route under steam so long as the wind is not strong enough to stop her; and it may sometimes happen that the wind will haul to the South and S.E., then to N.E., which will allow a very quick passage to be make. To sum up, when to the eastward of the meridian of Cape Horn, it will be prudent to avoid getting very close to the coast. With this single reservation, we can recommend the constant choice of that tack which gives the most westing.

After having passed the meridian of the cape, there is no longer anything serious to be feared in the neighbourhood of the coast. The route to be followed will be about W.N.W., and vessels may run N.W. by W., or even N.W., so long as they remain from 50 to 60 miles off shore. The winds will predominate from N.W. to S.W., and may always be advantageously utilized, except when it blows a gale from the N.W., because in that case vessels will have to "lie-to" on the port tack. In all other cases, the N.W. winds will permit a course of S.W. or W.S.W. to be run, which will be a very fair one; on the other hand, if the winds from S.W. blow very strong, a still better course may be made on the port tack. The real difficulty in doubling Cape Horn consists in running down the longitude between the meridian of Staten Island and that of 68° or 68° 30′ W.

In regard to the best point of crossing the parallel of 50° S., we think it sufficient if it is crossed at 80° W., when bound to Valparaiso or any other port in Chili or Peru; but it is certain that vessels bound to California or Mexico have every advantage in crossing that parallel much farther to the westward (about 95° or 100° W.), that is, provided the winds and weather encountered will permit its being done.

The navigation around Cape Horn, and on the western coast of America, as well as of the whole of the South Pacific Ocean, will be found in FINDLAY'S "*Directory for the Navigation of the South Pacific Ocean.*"

SECTION VII.

THE COASTS OF AFRICA, FROM CAPE MOUNT TO CAPE LOPEZ, INCLUDING THE ISLANDS OF FERNANDO PO, PRINCES, ST. THOMAS, AND ANNO BOM.

I.—GENERAL DESCRIPTION AND DIRECTIONS.

In our Memoir for the North Atlantic Ocean, we have given a description of, and directions for, the African Coast, from the Strait of Gibraltar to the River Gallinas, or Galinhas; our present object is, therefore, to give a similar description of, and directions for, the coasts and harbours between Cape Mount and the Cape of Good Hope; and, further, a continued description of the coast to Algoa Bay, &c. These we divide under two general heads—the first, from Cape Mount to Cape Lopez; and the second, from Cape Lopez to the Cape of Good Hope, &c.

The coast on the northern side of the Gulf of Guinea is divided in several ways. The natural division contains the Grain, Ivory, Gold, and Slave Coasts; politically it is divided into the coasts of Liberia, British Possessions on the Gold Coast, Dahomey, and Benin. The coast westward of 4° W. is also named the Windward Coast.

The WINDWARD COAST, with which we commence our description, comprehends all the coast from *Cape Mount*, 42 miles N.W. by N. of Cape Mesurado, to the country in the vicinity of Cape Lahou, nearly 2¼° westward of Cape Three Points, where the *Gold Coast* begins. The Windward Coast includes the three particular coasts called the *Grain Coast*, or *Malagette Pepper Coast;* the *Ivory*, or *Teeth Coast;* and the coast of *Adou*, or *Quaquas*.

The GOLD COAST extends eastward to the *River Volta*. The interior, to the northward, comprises the kingdoms of Ashanti, &c. Beyond these, farther eastward, are the kingdoms of *Dahomey*, *Benin*, and *Warree*, extending, on the coast, from the River Volta to Cape Formosa. Thence follows the *Bight of Biafra*, from Cape Formosa to Cape Lopez, including the islands of Fernando Po, Princes, St. Thomas, and Anno Bom, all of which we include in the present section.

The whole of the Gold Coast is nominally under British rule, the Dutch and Danes having ceded their possessions to the British, and the French withdrawn from Grand Bassam and Assini since 1870. The coast given by the Dutch in exchange for British territory in Sumatra, extends from the Assini River in about lat. 3° 25′ W. to a position midway between St. George d'Elmina and Cape Coast Castle, where the Sweet River enters the sea. Thence the British coast line extends to Vogee in long. 1° 5′ E.; altogether from Assini to Vogee being an extent of about 250 miles of coast. The interior jurisdiction can only be guessed at, averaging, probably, 60 to 100 miles inland to the borders of Ashanti, and including the Assini River to the West, and the River Volta to the East. From Grand Bassam to the Volta, gold dust is the medium of exchange.*

NATIVES.—Ethnologically, Western Africa may be divided into three grand divisions—*Senegambia*, and *Northern* and *Southern Guinea*. The first of these including the tribes between the Rivers Senegal and Gambia, and the two latter all the tribes to the eastward as far as Cape Negro, in lat. 16° S.; Northern and Southern Guinea being divided at the Camaroones River.

In matters of trade these people commonly possess sufficient acumen; and it has been especially intimated to the European visitor that, in trading with them, punctuality is of the utmost importance; for confidence once lost by breach of contract, or unfair dealing, is not to be regained. Of their dialects, Capt. Adams says:—The Tower of Babel might have been built on the western shores of Africa, 5° North of the Equator, and its inhabitants dispersed to the North, East, and West; for almost every tribe (and they are innumerable) has a distinct language, unintelligible to the others; and as they have not among them any written character, the different languages spoken can be learned only in those countries where they are used. The enunciation of all that I have heard spoken is soft and harmonious; the words composing them abound in vowels, and generally terminate in them. Their compound words seldom exceed four syllables, and frequently entire sentences not more. Their language is adapted to their habits and wants; and as these are extremely few and simple, and nearly similar in all, the construction of the different languages is the same.

There are no large or extended political organizations in Western Africa, with the exception of the kingdoms of Ashanti and Dahomey, and neither of these has a larger population or greater extent of territory than the smaller kingdoms of Europe. Nominally, monarchy is the only form of government acknowledged among them; but when closely scrutinized, their systems show more of the popular and patriarchal than of the monarchic element.

We shall now describe some of the more prominent tribes, commencing with those of Senegambia, where the principal are the *Jalofs*, *Mandingoes*, *Fulahs*, and the *Susus*, the latter of which partly belong to Northern Guinea; scattered among these are numerous smaller clans, whom we shall not notice.

The *inhabitants of Senegambia* are distinguished from those of Northern and

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* For further particulars respecting the trade, &c., of the West Coast of Africa, see a paper by Captain R. F. Burton in "Ocean Highways," Feb. 1874, pp. 448—461:

"Our Settlements on the Gold Coast," Ocean Highways, July 1873, p. 146:

A paper by Mr. Consul Hutchinson, on "The General Features of West African Trade," in the Journal of the Society of Arts, Vol. XXII., 1874, p. 314;

A paper by Andrew Swanzy, Esq., Journal of the Society of Arts, Vol. XXII, 1874, page 478:

Also a paper by James Irvine, Esq., on "Our Commercial Relations with West Africa," in the Journal of the Society of Arts, Vol. XXV., 1877, p. 378;

"The African Sketch Book," by Winwood Reade. Smith, Elder, and Co.

Southern Guinea, by being Mahomedans, and standing something higher than the pagan tribes in point of civilization.

The principal settlement of the *Mandingoes* is in a country which bears their own name, near the sources of the Senegal, and about 700 miles from the sea coast. They have formed small trading villages around all the European settlements on the Gambia, at Sierra Leone, and sometimes go so far down the coast as Monrovia. Taken altogether, they are perhaps the most civilized, influential, and enterprising of any of the tribes of Western Africa. Generally they are men of tall stature, slender, but well proportioned; black complexion, and woolly hair, but with much more regular features than belong to the true Negro. Their dress consists of a three-cornered cap of their own make, of short trousers, over which is thrown a sort of blouse or square cloth, also of their own manufacture, and leather sandals.

The *Fulahs* are a more numerous people. Their original country is Fuladu, N.W. of Manding, and between the Niger and the sources of the Senegal. Besides this, they occupy three considerable provinces in Senegambia, viz.:—Futa-Torro, near the Senegal, Futa Bondou, and Futa Jallon, the capital of which is Timbu, to the N.E. of Sierra Leone. Those seen at Gambia and Sierra Leone are of a dark brown complexion, soft curly hair, features regular and good, limbs delicate and well formed, and stature about middle size. These traits of physical character, however, are not peculiar to the Fulah people.

The *Jalofs* occupy all the maritime districts and a considerable portion of the interior parts of Senegambia. They have a country of well-defined limits, and dwell under one compact government. They are divided into four provinces or kingdoms, but acknowledge one great chief. The four provinces are, Cayor, which formerly included Cape Verde and the Island of Goree; Sin, a small state to the South of Cayor, and embracing about 30 miles of sea coast; Salem, a province lying along the northern banks of the Gambia; and Brenk, which includes the residence and the principal dominions of the Emperor. The entire population of the Jalofs is supposed to be about a million, which is much less than that of the Mandingoes, and perhaps not one-third of that of the Fulahs. In stature, the Jalofs are very much like the Mandingoes, but have less of the Negro features. Nothing, however, is so striking in their appearance as their intense black and glossy complexion.

The tribes of Northern and Southern Guinea are a pagan people, differing much in their religion and forms of worship. They have, however, a conviction of the existence of a Supreme Being. In Northern Guinea there are six principal tribes who speak different languages, and also differ in appearance, &c. Taking them in geographical order, commencing from the westward, the first are the *Vai family*, whose chief settlements are about Cape Mount. They are very black, of slender form, and more intellectual than the surrounding tribes.

The *Krus*, who inhabit the Grain Coast, include the people of Bassa, the Fish, the Kru proper, Sestos, Grebo, and St. Andrew. They are tall, square-built men, and, in many respects, an extraordinary race of people. A different language is spoken at every 10 or 12 miles, though these different languages are generally understood by the natives all along the coast. The Krumen have a singular custom, peculiar to themselves, which is a system of apprenticeship. A number of young men will attach themselves for a certain period to a headman. This headman has made one or more voyages to leeward to the Oil Rivers, before he can obtain a name, or be allowed to build a house, or to trade; and it is the duty of this headman to ship the boys off for the Oil Rivers on board of any vessel he can; and for this service the headman is entitled to one month's advance always paid by the ship. He is also entitled to a certain portion of the boy's wages on his return. When the boy has made two or three voyages, and can speak English fluently, he becomes a headman himself.

The Kru language is principally a combination of vowels, and, from the peculiar nasal pronunciation, can rarely be acquired by Europeans. He is generally found faithful in a strange country, but must not be trusted in his own. Their national mark is an arrow on each temple, the point toward the eye.

Speaking of their physical qualifications, Mr. Consul Hutchinson says:—"I believe them to be the bone and sinew of the Negro races of Western Africa, the only men of the Ethiopian tribe who will bear any amount of hard work without complaining." They are invaluable on board ships trading on this coast, for relieving the European sailors from exposure, fatal to their health in this climate.

The *Kwakwa* or *Avekwom family* extends from Frisco to Cape Apollonia, and takes in the different communities living at Frisco, Cape Lahou, Jack-a-Jacks, Bassam, and Assini. In size they are less than the Krumen, but are remarkably well made. The *Tuta* or *Amina family*, of whom we have had so much experience during the recent troubles on the Gold Coast, include the Fanti, Ashanti, and all the smaller tribes on the Gold Coast, with the exception of the Accra people, who are supposed to be more nearly related to the Dahomey tribes.

The *Dahomey family* extends from the River Volta to Lagos, and consists of five or six tribes, all more or less related. They are described as tall, well-made, straight, and robust, with black complexion, but not so "jet" as those of Fanti or Senegambia.

The *Benin family* occupy all the country between the Lagos and the Camerones Mountains. It includes all the principal settlements on the Oil Rivers which form the Delta of the Niger. They are all extensively engaged in the manufacture and sale of palm oil, and the number of vessels which go there for the purpose of carrying on this trade, especially from Liverpool, is greater than is to be found upon any other part of the coast. The country they inhabit, however, is very uninviting and unhealthy, and the character of the people, with the exception of those of Old Calabar, is that of a comparatively low order of savages.

The *inhabitants of Southern Guinea* constitute a part of one great family, which extends over the whole of the southern half of the continent of Africa. Their language is entirely different from those of Northern Guinea, and there is greater similarity in the language of the different families, of which there are five principal, all very much alike in appearance, &c.

"The *Trade* on the West Coast of Africa is now, mainly, what it has always been— one of barter: that is to say, that for every ton of palm oil purchased from a native merchant you give him Manchester cloth, Birmingham knives or guns, salt from Cheshire, and so on. The proportions in which these articles are consumed differ according to each market, and not only do they vary in amount, but also in style. The goods suitable for Cape Coast Castle are utterly unsaleable in Lagos; the cloth bought for Bonny would be worthless in Old Calabar, though the two are only 100 miles apart; and the camp oven of Gaboon might be turned into a drum on the banks of the Congo.

"Speaking from my own experience, the proportions in what is called the 'river trade,' that is in the Bights of Benin and Biafra, are as follows:—Manchester goods, 43 per cent.; tobacco, 18; Birmingham and Sheffield goods, 14; timber, 7½; provisions and rice, 6; gunpowder, 4; salt, 3; earthenware pipes, &c., 1½; beads, 1; soap, 1; and fishing nets, bags, &c., 1 per cent. From this list I have omitted rum and other spirits."—*James Irvine, Esq.*, *Society of Arts Journal*, 1877.

Climate.—The unhealthiness of Western Africa to the European constitution arises from its moist and hot atmosphere, impregnated, as it commonly is, with the miasma or malaria of the marshes; but prejudicial as it is to the European, the natives seem to enjoy good health, and to live to a tolerably old age. The wet season, however, like the winter of Europe, produces inflammatory attacks of the lungs and pleura, with catarrh, or colds, &c.; and the Africans seem peculiarly sensible of the least change in the temperature of the atmosphere.

In the Appendix, at the end of this volume, are some useful remarks on the means of preserving health in tropical climates.

Remarks by Captain Thomas Midgley.

On the passage from England to the Western Coast of Africa, it may be well to make the Island of Madeira, and sail to the westward of it if possible; for by so doing the ship will be placed in the best position as to her future course. After passing Madeira, steer so as to leave Palma about 70 or 80 miles to the eastward (if nearer, the ship is liable to be becalmed), and then steer a course to make the N.E. end of Bonavista.—Bonavista requires a good berth, as the currents about it are strong and uncertain, and dangers extend from the North and East sides to a great distance from the land.

In the winter, when strong westerly breezes, of long continuance, prevail to the northward, it may be impossible to make Madeira without much trouble and delay; in this case, endeavour to get a good observation for longitude, or a sight of the Salvages; and, should the westerly winds still continue, run boldly to the southward. On nearing the Canary Islands, you will find the wind either gradually decrease to a calm, or it will veer to the northward with heavy squalls. The squalls in this neighbourhood give little warning, but are frequently exceedingly heavy and dangerous. Any ship may very safely run through the passage to the eastward of Palmas, as a strong steady N.N.E. or N.E. breeze almost constantly blows through it; and, by keeping mid-channel, there is little fear of being becalmed. When clear of the Canaries, a course may be shaped to make Bonavista, as above directed.

The passage between the islands and Cape Verde is generally and very properly adopted by vessels trading to the Western Coast of Africa; for, by running to the westward of St. Antonio, they have again to make easting in that tract of sea which, lying contiguous to the southern limit of the N.E. trade wind, is so often disturbed by calms, squalls, thunder, lightning, and heavy rain.

The currents between the coasts of Great Britain and the Cape Verde Islands are now so well known, that it is almost superfluous to make any further remark upon them, excepting that their velocity is by no means exaggerated; and the dangerous effect which they have upon vessels, between the Bay of Biscay and the Capes Noon and Bojador, on the African coast, cannot be too strongly impressed upon the minds of those who have charge of valuable lives and property.

Those passing Bonavista in the months of June, July, August, and September, should not be too anxious to make easting; for they will lose the trade wind very soon after passing the parallel of the Island of St. Jago, and, after a short interval of calm, fall in with the S.W. wind and its usual accompaniments of heavy squalls and rain. On the farther progress the vessel makes to the southward and eastward, the S.W. wind generally becomes variable to the westward, and the squalls not so frequent.

At this season of the year it is advisable to give *St. Anne's Shoals* a berth of 150 miles to the eastward, as the sea sets in so heavily upon the coast, between these shoals and Cape Palmas, that making southing when near the land, in these months, is attended with much difficulty.

From October to April or May the weather in this tract is generally fine, and the nights cool, beautifully serene and clear, with heavy dews; and in these months a more direct track may be pursued from Bonavista to the southward and eastward, than the one above mentioned. In the influence of the trades, the breeze is generally steady from N.N.E. and N.E., and the sea smooth; occasionally, however, interrupted by tornadoes, which, in the neighbourhood of Cape Verga and Sierra Leone, blow with terrible fury. Such is their violence, that it is frequently necessary to keep the ship directly before them, under a foretopmast staysail only.

Between the Cape Verde Islands and the coast, the currents in the above tracks are variable, but mostly found running to the southward, and seldom exceeding 1 mile an hour; generally from half to three-quarters of a mile, until hauling up for St. Anne's Shoals. At about 120 miles to the westward of these, I have several times found them setting about E.S.E. by chart, fully 1½ mile in the hour.

The sea between the meridian of 20° W. and the bank of soundings extending from the African Coast, is perhaps the most luminous part of the Atlantic Ocean. In the very dark gloomy nights of the wet season, with a strong breeze of wind, and when not one solitary star is visible, nothing can exceed, no pen can describe, the awful grandeur and magnificence of the scene. The whole surface of the sea appears as one vast sheet of liquid fire; and the ship, sailing at the rate of 6 or 7 knots through the water, causes streaks of light to be emitted from the sea, that throw a strong yet sickly and appalling glare upon all the sails, creating an indescribable sensation in the mind, that is very far from being agreeable, as the vessel appears to be surrounded by breakers on every side.

Although I have several times noticed this luminous appearance in the same tract, I am led to remark more particularly upon it on account of a most awful night which I passed on the 24th of August, 1834, in or about lat. 7° 30′ N. and long. 17° 50′ W., which left an impression upon the minds of all on board that I fancy will not be very soon effaced; for the vessel appeared to be sailing through a sea of liquid fire, whilst the heavy dark mass of clouds appeared to rest upon her mast-heads, and not a single star was visible amid the horrid gloom. No bottom was found at 120 fathoms. Temperature of the air 82°, and of the water 79°, Fahrenheit.

Vessels in want of Krumen should call at *Grand Sestros.*—From some years' experience I can confidently say that they are the most willing and best disposed men upon the Kru Coast; and, if well used, are faithful to their employer in every difficulty he may have to contend with to leeward. Every vessel should take four or five, or more of them, in proportion to her size; for, in the Oil Rivers, if white men are exposed in the boats or canoes, landing or taking in casks, they very soon fall victims to the climate. The Krumen prefer rice to any other diet, and a good supply can generally be procured at a cheap rate, except between January and June; but, considering the detention of lying-to, in order to procure it, the rice may be exported from England, for ships' use, at very nearly as cheap a rate. One of the Krumen is of more real service in the Oil Rivers than two Europeans; they are generally well versed in the English language, and are contented with a dash or present when left at Fernando Po, after the vessel has completed her lading.

On approaching the Kru coast it is usual to hoist the ensign and fire a gun, and the vessel will soon be surrounded by canoes. A small canoe may be purchased for the ship's use for a mere trifle, and will be found extremely serviceable in the rivers.

The navigation between Cape Lahou and the land of Formosa, presents no difficulties to the navigator; the currents in the route run to the eastward at 1, 1½, and sometimes 2 knots or more, in the hour. If there be no inducement to call at Bereby, Drewin, or Cape Lahou, for ivory, it will be as well (and will certainly expedite the passage) to shape a course from Cape Palmas for Cape Three Points; and then, giving that land a berth of 15 to 18 miles, shape a course for the land of Formosa.

In steering across the Bight of Benin, the current will be generally found running about 1 mile an hour to the N.E., and must be allowed for, by steering one-third of a point to the southward of the direct course.

A mere inspection of the chart will show that what is erroneously called Cape Formosa is, in fact, an elbow land rounding off gradually to the eastward; and regular soundings upon a muddy bottom extend for some considerable distance to the westward and southward of it. The land is here extremely low, and should not be approached in the night nearer than in 8 or 10 fathoms, unless by a vessel prepared to anchor.

After making the land, the oldest and most experienced traders to the Oil Rivers are frequently deceived as to the position of the vessel. For the best description of the rivers from Formosa to Bonny is but vague and imperfect; and I therefore proceed to give such directions as I think, from my own experience, will be found useful to vessels bound to the Bonny or New Calabar Rivers.

The rivers between Terra Formosa and Bonny have all shoal bars at the entrance, and generally appear from the offing to be narrow. They have no peculiar feature to distinguish them, other than their being open to such points of the compass as are expressed in the Sailing Directions.

SEASONS.—The rains generally commence in the latter end of May, or early in June, and gradually increase, with strong S.S.W. and S.W. breezes, during the months of July, August, and great part of September, toward the end of which month they as gradually terminate. In July and August heavy squalls frequently prevail; and in these months the wind very rarely shifts more than between S.S.W. and S.W., and the rain is incessant from sunset to nearly noon next day, when it ceases for a few hours, and again commences with more or less violence in the evening. In October the weather becomes more settled, with light land winds, and occasionally showers of rain, which, however, yield to the moderate sea-breeze that sets in about 10 or 11 a.m. In November the tornadoes commence, and are at first violent, gradually decreasing in strength as the *Harmattan* or *dry season* commences, although they are occasionally prevalent from this month to May. In December, January, and February, is the Harmattan season; and in these months the sea-breeze sets in about noon, and blows with very moderate force from the W.S.W. and westward until sunset, when it dies away to a calm. During the night there is little or no wind, and the weather is extremely sultry and oppressive, with very heavy unwholesome dews. After daylight a light air springs up from the northward or N.N.E., which gradually increases to a moderate force, and continues until about 11 a.m., when it falls calm, and soon after is succeeded by the light westerly breeze. The Harmattan, however, sometimes blows steadily and without intermission from the N.E. quarter for several days together, especially about the new and full moon. It is at this season that the *smokes* prevail, and are exceedingly injurious to the European constitution. These smokes are so dense that it is impossible to see a cable's length from the ship for days together; and any vessels that may be in the offing, inward bound, have no resource but to anchor, and wait with patience for clearer weather. In March, April, and May, the weather is clear, with light land winds at daybreak, which gradually die away, and are succeeded by the W.S.W. breeze at about 10 a.m.; and this breeze blows with moderate force during the remainder of the day and the greater part of the night. In these months the atmosphere is serene and clear, particularly during the nights, which are very fine indeed. The palm oil season commences in the early part of March; the oil becomes plentiful in April, and continues to be so until September, when it declines; from October to March it is, properly speaking, out of season, although small quantities of it may be procured in these months.

In the foregoing remarks as to the seasons and climate, I beg to be understood as speaking of the New Calabar and Bonny Rivers only, and now proceed to consider the best means of preserving the health of the crews of vessels trading there. Masters of vessels should be on their guard against shipping plethoric or lusty men to go to the Oil Rivers of Africa. Drunkards are still worse subjects than these; for if a man undermine his constitution by intemperance in England, he cannot repair it in Africa. I have too frequently remarked that human skill is of little avail in saving the life of a drunkard, when once attacked with the African fever. The fact is, a drunkard is predisposed to sickness, and soon falls a victim to the climate. The plethoric or lusty man, if he has not tampered with his constitution, has rather a better chance; but should he fortunately recover from the fever, he is often annoyed with attacks of ague all the passage home, and does not recover his health until he arrives in England. Thin, raw-boned subjects are the best for the coast of Africa; and they should be selected from men who have made several voyages to the West Indies, as they are, in some degree, seasoned to a warm climate; and those that have never made voyages to a tropical climate should be decidedly rejected. To preserve the health of the crew, the vessel should be housed over as soon as possible after her arrival in the river. Plenty of mats should be procured, and a good, substantial, tight house be at once made, to shelter the crew, and preserve the vessel from the weather. Every care should be taken to make the house perfectly water-tight, as well for the comfort and health of the seamen, as for the advantage of working the palm oil in wet weather. An overstrained economy in the purchase of a few mats is highly reprehensible. The seamen will generally hang hammocks under the house, and, if well sheltered from the weather, will enjoy better health than they would by sleeping below in the steam emitted from the oil. In these rivers it is presumed that the Krumen do all out-duty required in the boats, &c.; for a European should not be allowed to put his foot over the side, either for the purpose of visiting or going ashore, even on ship's duty (unless unavoidable), as it infallibly leads to dissension and drunkenness, from the worst of spirits; and a drunken fit in Africa is the almost sure forerunner of sickness, and probably death.

All vessels should keep a sufficient quantity of English water on board for use in the country, as the Bonny and New Calabar water has an immense quantity of animalculæ, is very unpleasant to the palate, and injurious to the health. Cocoa is an excellent and nutritious article of diet; and the crews should be well supplied with yams, the only vegetable, excepting corn and plantains (the latter not plentiful), that can be procured in these rivers.

If the crew unavoidably get wet, they should immediately rub themselves thoroughly dry with coarse cloths, and put on dry clothes. The forecastle should be frequently cleaned out with a solution of chloride of lime, and the seamen's clothes and bedding kept well aired. Attending to these precautions will be found the best means of preserving health.

Here I may observe that fresh stock of all kinds is very scarce and very dear in these rivers, so that vessels bound to Bonny and New Calabar would do well by procuring their fresh stock and corn to windward, either on the Kru Coast, Frisco, Cape Lahou, the various settlements on the Gold Coast, or at a small village on the sea coast, near Cape St. Paul, called Dokko, or Occo. At these places stock of all kinds is abundant, and very cheap when obtained in barter.

CURRENT.—I have almost omitted putting the mariner upon his guard against the effect of the strong easterly current that runs from Terra Formosa to Old Calabar. This current runs with greater or less velocity almost throughout the year, except in or about the Harmattan season, when it occasionally sets to the westward and W.S.W. Vessels that have advanced much to the eastward of Terra Formosa, and cannot see Foché Point before night, should anchor, in order to prevent the effect of the current; but in squally weather, or the wet season, it may be as well to work to windward, heaving-to occasionally during the night, according to circumstances; 9 or 10 fathoms is quite close enough to stand in-shore in the night; when in 6 fathoms the surf can be very distinctly heard.

When once to leeward on this coast, getting up to windward again is attended with much trouble and difficulty. I may here remark, that too much attention cannot be paid to the lead upon any part of the coast of Africa, as the current frequently sets directly in upon the land; and from careful observation, upon the windward coast, I can confidently assert that the thermometer is no guide whatever in approaching the land. In more than 100 experiments upon the *surface* water, I could never detect any sensible difference in the temperature when sailing toward the land from no bottom into 45 and 40 fathoms, and thence close in-shore into 14 or 15 fathoms on the Kru coast. In the dry season there is little difference hereabout in the temperature of the air and water —the former averaging 77° to 81° (in the shade), and the latter 74° or 75° F.

DIRECTIONS.—The *Homeward Passage*, through the Bight of Biafra, presents no particular feature to the attention of the navigator, if I may except the strong N.E. currents that almost invariably prevail in it. All homeward bound vessels, that do not intend calling at Fernando Po, should use every possible exertion to pass to the westward of the island, as a good board may be then made to the southward on the starboard tack. Except in the Harmattan or tornado seasons, no advantage can be derived by standing close in-shore, as there are no land winds, and a near approach is, at any time, very dangerous, as the whole of the coast, from Camaroons to the Gaboon (except about Corisco), is generally bold-to, and the soundings in nowise to be depended on. On this part of the coast there is no trade, and the inhabitants are miserable naked savages. On getting to the southward of Prince's Island, the very excellent directions of Mr. Finlaison (given hereafter) may be followed with advantage.

Many navigators have remarked that, on standing to the westward between Prince's and St. Thomas's, even when making a trifle of northing, the N.E. current has been found to diminish in strength as the vessel makes westing. Even so far to the southward as 3° South there is seldom any easting in the wind before passing the meridian of Greenwich.

Vessels bound to the *northward* should not attempt crossing the Equator to the eastward of 20° W. (the meridian of 21½° W. is to be preferred), and should then make a North or N. by W. course, to get into the N.W. trade wind, which, having once fairly gained, the homeward navigation is generally well understood. In this route, after leaving the Guinea Current in the Bight of Biafra, the ship will gradually get into the Equatorial Current as she gets to the southward, and this current frequently runs with considerable velocity. On examining my journals, I find that, by good lunar observations and an excellent chronometer, I have, at various times, made the following differences to the *westward* of dead reckoning, in the run from St. Thomas's to longitude 20° West of Greenwich, between the parallels of 0° 35′ North, and 3° of *South* latitude. In April, 1830, the brig *Anne* was set 237 miles to the westward, and 78 miles to the northward of account in 20 days. In October and November, 1831, the barque *Severn* was set 240 miles to the westward, and 94 to the northward of account in 23 days. In October, 1833, the *Freeland* was set 246 miles to the westward, and 51 to the northward of account, in 20 days. In August, 1835, the same vessel was set 228 miles to the westward, and 43 to the northward, in 19 days. And in November and December, 1836, the brig *Caledonia* was set 373 miles to the westward, and 107 to the northward, in 18 days. But it may be observed that, in the latter vessel, I never crossed the Equator, but was generally 8 or 10 miles to the northward of it, until I crossed the meridian of 12° W. In the above runs I have occasionally, but rarely, found slight differences to the southward. When to the southward of the Equator, abreast of the Bight of Benin, I have always found a current running at least three-quarters of a mile an hour to the northward.

Directions for Sailing from the Bight of Biafra to Sierra Leone.

By the late Mr. James Finlaison.

Ships bound from the Bight of Biafra to Sierra Leone, if from Calabar River, when the wind does not permit them to proceed by the N.W. of Fernando Po, may pass between that island and Camaroens River, when they will find a strong current setting to the southward, apparently out of the River del Rey. After they have advanced to the southward of Fernando Po, they must endeavour to make all the southing and westing they can; passing either to the eastward or northward of Prince's Island, as winds will permit. On the East side of this island the current sets strongly to the southward, at the rate of 1½ knot; westward of Prince's Island the current generally sets strongly the N.E. at the same rate.

Having arrived to the southward of Prince's Island, if the ship will lie no higher than W.N.W., tack immediately, and try to cross the Line; for, by so doing, you will keep out of the strong N.E. current (the *Guinea Current*) that sets towards the Bights of Benin and Biafra. After you have crossed the Line, you will find that you are nearly out of the eastern current. In the parallel of 1° South you will find the current set to the westward, at the rate of 1 mile an hour. In the months of May or June, when the sun has a high declination, the trade wind is fair to the southward, and you will not gain the regular breeze nearer than in 3° South. This breeze commences from S. by W. As you make westing, the wind will be found to haul more to the southward and eastward, and the current increases to the rate of 1½ knot in an hour, until you arrive as far to the westward as 15° West. On proceeding hence to Sierra Leone, come no farther to the eastward than 15° West, until you are as far to the northward as 8° 30′ N.; then you may steer boldly in for the cape. You will strike soundings in that parallel, in 14° 40′ W.; and as you approach the cape the soundings will be found very irregular, from 20 fathoms to 12 at a cast. You will then be 7 leagues from the cape and in the fair track of the river.

Having given these directions to our prize-masters, they generally made the passage from Fernando Po or Bonny in five weeks; merchant vessels have frequently been three months, by keeping in-shore.

BY COMMANDER W. B. OLIVER, R.N.

Conceiving that a shorter passage from the Bights, or Prince's Island, to Sierra Leone, than that made by proceeding as recommended in the Book of Directions, to the southward of the Line, might be made by keeping to the northward, I determined to ascertain the fact; and though each time accompanied and retarded by a prize, made three unusually short passages, viz.—one from the River Bonny, anchoring at Prince's, and landing prisoners at St. Thomas, in 18 days; the other two in 13 days each from Prince's Island to Sierra Leone; and, on returning to England in Her Majesty's schooner, unaccompanied by a prize. Thirty-nine days having been the shortest route of the three prizes I sent up under the old directions from Benin and the Gaboon. I issued different directions to prize-masters; and, although not acted on, in absence from myself, I feel assured they would have proved, as they did in my company, an improvement on the old one; a copy of which directions are as follows:—

Your first object will be to get to the southward, unless you can make a West course (*true*) without any northing; nor should you go on the port tack unless you can do so, or to avoid the land. Should the wind hang so much to the westward as to prevent making a good course on the port tack, pass to the eastward of Prince's or St. Thomas, or both, as you will sooner get out of the strong easterly current, but do not approach the land within 20 fathoms, day or night, and get frequent casts of the lead.

When to the westward of St. Thomas, and on or near the Line, steer W. ½ N., or W. by N., according as your noon sights give you a northerly set or not, until in the longitude of Cape Palmas, 7° 45′ W.; when steer, in the rainy season (May to September), N.W. by N.; in the other months, N.W., until in 13° West, the longitude of the western limit of the St. Anne Shoals; you may then make a true North course, sounding every 5 miles by night, or thick weather, and every 10 miles by day, from 6° N. to 8° N. If you reach the latter without striking soundings, it will prove that you have passed to the westward of the St. Anne Shoals: when keep away E. by N. by compass, to 8° 15′ N.; then steer E. by S. ½ S. (*East, true*), and you will make the high land of Sierra Leone; if by night, anchor on reaching 12 fathoms.

These instructions can only be acted on in a general way, as, of course, much depends on winds and currents; but I wish them to have full weight with any officer detached in a prize; and, remember, the land about Sierra Leone should always be made to the southward of the Cape.

II.—THE WINDWARD COAST.

This coast was surveyed by Captain Vidal, R.N., in H.M. ships *Etna* and *Raven*, in the year 1838. His survey of the coast, notorious for its unhealthiness, is 900 miles in extent, between Cape St. Anne and Cape Lopez.

The River Gallinas, with which we concluded our description of the coast in the "North Atlantic Memoir," is the boundary of the territory of *Sierra Leone*. It is famous as having been a great mart of the slave trade; near its mouth is the slave factory of the famous Pedro Blanco. The bar is not difficult to clear for coasters or native boats, except during the tide races. It may be done by watching the swell. The coast here is very low and remarkably uniform, and for this reason three large baobab trees near the mouth of the Gallinas are an excellent landmark. At about 9 miles south-eastward from the mouth of the Gallinas is that of another small river, the *Manna*, off which you may anchor in 9 or 8 fathoms: this mouth is nearly shut up by the beach on which there is always a great surf. It is sometimes called Roc-manna, from the unusual circumstance of the shore being covered with blocks of black rocks. At 8 miles farther S.E., passing several villages or factories, you find the little *River Sugury*, where are a few establishments belonging to American black settlers for the export of camwood; beyond is the bight formed by *Cape Mount*, having from 10 to 14 fathoms water, with a bottom of black mud.

From the River Gallinas to Cape Mount the coast is very low, and covered with trees. It has a fine sandy beach all the way. At 5 or 6 miles off there are regular soundings, from 15 to 18 fathoms, mud and sand, until you arrive at Cape Mount. H.M.S. *Tartar* anchored in 15 fathoms, muddy bottom, with Cape Mount bearing S. by E., and a remarkable large clump of trees North. Merchantmen anchor farther in, in 9 and 10 fathoms.

CAPE MOUNT, which may be seen at 27 to 30 miles off, is a promontory of high hills, projecting into the sea, the highest peak being 1,066 ft. above the sea; on each side the land is low, rather higher on the North side, with a flat sandy beach to the eastward. The cape itself is distinguished by cliffs, which may be seen 12 miles off. It is very remarkable, especially in coming from the westward, when it first makes like an island, and contrasts greatly with the low and uniform coast to the West of it. In the night you should not approach nearer than to 26 fathoms, unless well acquainted.

To the northward and westward of the cape lies the road, into which you may run, until the point of the cape bears South and S. by E. There, in the summer season—that is between October and May, when the weather is generally fair—is anchorage in 9, 8, 7, and 6 fathoms, sandy ground; but it is more common to lie in 15, 14, 13, 12, and 10 fathoms, because the tornadoes and southerly winds sometimes make a very hollow sea. The watering place is near a large tree in front of the outer point of the cape; and here, in the fine season, you may take in water with great facility.

In coming ashore with your boat, you must bring a hawser with you, and fasten one end of it to the land, the other being dropped with the anchor to seaward, so that you may prevent the breakers by it; for you run directly against the flat beach below the town, without any shelter of banks or cliffs; in the morning you may easily get ashore with smooth water.

To the northward of Cape Mount there is a river of the same name, where, as at Sugury River, are a few small factories, principally for trade in camwood. The mouth of this river is nearly closed up by a sand-bank, and is at times open to boats. *Mahfah*, or *Cape Mount River*, has a depth of 12 ft. from Krootown, 1½ mile within the entrance, to Maquimbah, 10½ miles above the bar. Eastward of the entrance is a large sheet of water, 10 to 13 ft. in depth, known as *Fisherman Lake*. The current runs very strongly out, and the best time for crossing the narrow bar is at half-flood. Between the cape and the entrance of the river there is good riding in the bay, during fine weather, in from 15 to 6 fathoms; but from 14 to 12 fathoms should be preferred in the rainy season, and even there it is hazardous, unless provided with the best ground tackle; for southerly and S.W. winds, in that season, set into the bight with a tremendous sea and heavy gusts, which raise a violent surf on the shore, that may be heard at a distance.

The Currents along this coast, during the rainy season, are influenced entirely by the wind. When the breeze is fresh, a current of at least 2 miles an hour may be expected; if the wind is South of S.W., the direction will be N.W.; if to the West of S.W., an easterly or S.E. current running strong may almost be depended upon; and with a fresh S.W. breeze in August, a set of 1½ mile an hour has been experienced. During the month of November the set appears to be strong and invariable to the N.W. From the middle of December to May the current may be expected to be found running to S.E., 1 mile an hour nearly.

LIBERIA.—The colonization Society of the United States of North America, with the view of relieving themselves from the presence of emancipated negroes, took measures, about the year 1817, for founding a colony of free blacks on the Western Coast of Africa. After several unsuccessful attempts to obtain a settlement, they commenced upon Sherboro' Island. A worse place could not have been selected; for, soon after landing, the insalubrity of this most unwholesome place began to show its dreadful effects on the settlers. These consisted of twelve white men and a great number of coloured people. Eleven out of the twelve white men fell victims to the climate in a very few months; and the remaining one left in June, 1820, and most of the coloured settlers followed to Sierra Leone.

In 1821, settlers again arrived and established themselves on about 10 acres, on the banks of the River Mesurado, where the settlement of *Monrovia* was founded. They extended their footing on both sides of this river, with much opposition from the natives, the war with whom was continued until the latter part of 1823, when an officer and twenty-five men from a vessel of war volunteered to protect them; but it is a lamentable fact, that the whole of these men fell victims to their hardships, and the baneful effects of the climate. In 1824, the settlers turned their attention to commerce, and still extended their operations.

Liberia extends about 500 miles along the coast line, and to about 100 miles into the interior, its limits being the Shebar River on the N.W. to the San Pedro River, 78 miles eastward of Cape Palmas. For political purposes the Republic is divided into four countries, Montserrado, Grand Bassa, Sinou, and Maryland. It contains only four settlements or villages—Monrovia the capital, Sinou, Bassa, and Cape Palmas, the regions between being in a semi-savage state. The population has been variously computed at from 700,000 to 1,500,000. Americo-Liberians compose almost the only civilized portion of the inhabitants. The government is on the model of that of the United States, consisting of a President, and Secretaries of State, (Foreign Affairs, of the Interior), also a Postmaster, &c. There is a Senate and House of Representatives.

Palm oil is the principal article of export from the Republic; the supply is steadily increasing, and may be increased almost indefinitely. Camwood is again being received from the interior; also ivory in very small quantities. Palm kernels, gum-copal, Malaguette pepper, and a little coffee of good quality, are also exported.

A large portion of the trade of the Republic, especially in respect to British merchants, is carried on directly with the aboriginal inhabitants of the country, at numerous trading stations, where no custom-house is established. Foreign vessels arriving on the Liberian coast, and intending to engage in this coastwise trade, enter at some one of the ports of entry, and pay the customary import duty on their entire cargoes, upon which they obtain a general permit, and a license to trade and land their cargoes at any part of the coast designated. But it is said that much fraud has thus been practised on the revenue. The currency is ostensibly the dollar, but trade is virtually conducted on the barter system.

Respecting the prospects of the Republic, Mr. Winwood Reade says, "the Liberians have no money, immigration is slack, they do not intermarry with the natives, and the population is decreasing; they acknowledge themselves that their prospects are gloomy in the extreme. Nothing can save them from perdition except the throwing open of the land; the free admission of the European traders, and of negro settlers from Sierra Leone; or, in other words, the free admission of capital and labour."

CAPE MESURADO and LIGHT lies about 42 miles S.E. by S. from Cape Mount, hence its latitude is 6° 19′ N., in longitude 10° 49′ W. On the summit of the cape, 240 ft. above the sea, is a red lighthouse, 40 ft. high, exhibiting a *fixed bright* light, elevated 240 ft.; it is of small power, seldom seen more than 5 miles, and never to be depended on. Between Capes Mount and Mesurado the coast is very low, with a white sandy beach, above which the land is covered with trees of varying colours. About 4 miles N.E. by N. ½ N. of the cape is the entrance of the *River St. Paul*, navigable for boats only, having a depth of 7 ft. at low water; but ships may lie off it at pleasure, in from 16 to 6 fathoms, good ground. The depth of 10 fathoms is nearly 2 miles from shore. On the banks of St. Paul River and along the shore there are several native villages and some American factories, as well as a large settlement at *Caldwell*, 2 miles from the entrance, on the South bank of the river.

Here it may be repeated, that from Cape Mount to Cape Mesurado, as well as upon the coast from Cape St. Anne to Cape Mount, the rains begin with May, and continue till October, accompanied with much thunder and lightning, and furious gusts of wind from the N.W. quarter. During that time the sea sets so hard to the N.E. along the coast, and with such mountainous billows, that it is impossible to approach the shore; so that ships which, between July and September, happen to fall below Cape Mount, cannot, without great difficulty, get about to the South.

Cape Mesurado, though not so high as Cape Mount, is an elevated promontory, almost perpendicular on the North side, but with a gradual declivity toward the sea on the South. There are regular soundings, of 20 to 15 fathoms. muddy bottom, at 8 miles off shore, along which the current sets strongly, At 2 or 3 miles off shore, with the cape S.E. by S., is a depth of 15 to 10 fathoms, muddy bottom, and a common anchorage. With the cape bearing N.E., the land appears like an island, with trees rising out of the water to the

North; and at 20 miles off it appears in its insular form, the land on each side being very low.

In the winter months here, as at Cape Mount, vessels should lie well out, on account of the heavy sea in the bay, and the southerly winds, which would otherwise render it very difficult to get out to windward. To anchor at the cape in the rainy season, bring the mount to bear S.E., distance off shore 3 or 3½ miles, and come-to in 14 fathoms of water. A very tall tree, easily recognisable, surmounted the cape, which is also marked by the lighthouse on its summit.

MONROVIA, the capital of Liberia, contains about 300 houses and 4,000 inhabitants, and is built on a depression of the ridge which sweeps inland from the cape. On the summit is Fort Hill, which commands the suburbs, the river, and the inner harbour; from it is a very fine view. It is the outlet of the products of the St. Paul to the North, to which it is connected by *Stockton Creek*, on which are several flourishing villages. The import duties are high, especially on spirits.

Consul Hutchinson says, "The city is erected on an eminence, which you can ascend from the shore by either of three or four rugged pathways, past the church, an hotel, and the president's house, until you find yourself in some place, which one tries to realise into the fact of a street. But it cannot be done. Houses are jotted down as if they had been dropped from the sky; flowers of the richest hue are in the gardens; but there is a stillness, with an absence of spirit or business in the place, that made me at first wonder where I was. I looked up at the president's house, the chilliest, most prison-looking building at which I have ever gazed; then up at the lighthouse, a mammoth pepper-caster; then down the street, yet no sign of life was anywhere."

A college was completed in 1861, a fine edifice, built and endowed with funds sent from Boston, United States.

The usual anchorage for large vessels in Monrovia Bay is in 7 fathoms, sand, with the West extreme of the cape bearing S. ¾ W., lighthouse S. ½ E., and the middle of the town S.S.E.

After having doubled Cape Mesurado, another cape is passed almost as high as the cape itself, and which forms the South point of the peninsula of Mesurado. It is called *False Cape Mesurado*. Hence to the River Junk, a distance of 30 miles to the S.E., the coast is green, wooded, and in some places moderately high. At about mid-distance are the *Crown* and *Coxcomb* hillocks, 3 miles inland. This coast should not be approached within the 10-fathoms line, as there are one or two 3-fathoms patches lying off it.

The RIVER JUNK may be found by means of a remarkable saddle land, 1,071 ft. high, which stands at about 10 miles up the country, to the E.N.E. In 15 fathoms of water, clear sandy ground, you may anchor during the rains, with the river's mouth N.N.E. and the Saddle N.E., at 4 miles off shore. You may also anchor in fine weather at 2½ or 3 miles from shore, similar bottom, in 12 fathoms, with the mouth of the river North, and the Saddle N.E. It is to be recollected that in the rainy season the wind sets strong towards shore, and the greater distance is therefore required.

There are some sunken rocks on each side of the river's mouth, which boats may avoid by keeping in mid-channel. There is only 4 ft. on the bar at low water. *Marshall*, a small American colony, dependent on Liberia, is established on the left bank of the river. After clearing the bar, keep to the port side, steering to the fishermen's tree, or where they have constructed their cabins. Provisions may also be obtained from the colony on the right shore. Good fresh water may be obtained here. There is a small reef of 14 ft., a mile from shore, at 2¾ miles north-westward of the mouth of the river. At a mile from the mouth of the Junk is that of the *Little Bassa River*,* off which vessels may anchor in 7 or 8 fathoms. Its entrance is blocked up by sand.

Middle Bassa.—From the Little Bassa River to Middle Bassa, the coast trends to the S.E., consisting of red and white cliffs, apparently land-slips. *Bassa Point*, 1 mile to the S.E. of Little Bassa River, is a little rocky cliff, thickly wooded, with sandy bays on either side. About 1¼ mile S.E. from Bassa Point there is a small red and white cliff, which renders the spot remarkable. At 9 miles S.E. of Bassa Point we come to *Middle Bassa*, where there is a Liberian factory; and 3 miles farther to *Long-reef Point*, so named from a barrier of rocks 3 cables from the coast, which stretches along shore nearly 4 miles. The ground in the vicinity is all foul.

St. John River.—A slightly-inflected coast, wooded throughout, but apparently populous, reaches from Long-reef Point to Grand Bassa Point, a distance of 11 miles. At 2¼ miles North of the latter the St. John River discharges into the sea. Within the bar are concentrated the waters of three rivers, the *Mecklin*, flowing from the North; the *St. John*, from the N.E.; and the *Benson River*, from the East. With a skilful pilot the bar, usually rough, can be passed in safety.

The Benson River pours in its tribute opposite to *Edina*, and on the West side of the junction is the flourishing town of *Buchanan*.

The St. John River is as wide as would be the united streams of the Mecklin and the Benson. At 3 miles up it is separated into two branches by *Factory Island*. For 30 to 50 miles from the sea it is one uninterrupted camwood forest, and very large quantities are cut for fuel and export. The settlements on the St. John appear to be all flourishing.

Cresson, an establishment above alluded to, is about 2 miles S.E. of the mouth of the St. John. It is called Bassa Cove and Fish Town on the charts.

GRAND BASSA.—The American colonists of Liberia have two small settlements here, *Edina* to the eastward of the opening, and *Grand Bassa* on the opposite bank. The entrance of the river is blocked up by a very shallow bar, the least dangerous passage over which is close to its southern point of entrance. Inside, the water deepens to 2 and 3 fathoms, abreast of each of the settlements. About a mile outside, or W. by S. of the opening of St. John River, there is good anchorage in 6 or 7 fathoms, black mud.

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* "All these Bassas, great and little," says M. Boüet-Willaumez, "were formerly Norman establishments, as is evident by the names which still exist as given by those hardy navigators along all this coast. The words Great and Little Bassas, Great and Little Dieppe (Grand et Petit), have been retained, in spite of the half-English half-Spanish dialect which has been formed on the West Coast of Africa. The old remembrances of France, also, rendered easy the acquisition of the lands about Fishermen's River, which was done in 1842, for the purpose of a depot for refitting and refreshment for ships."

The best marks for Grand Bassa are the large houses built in the European style by the American colonists. The governor's house, over which floats a flag, nearly American, is the best point of recognition at a long distance. Approaching the place, the other houses become apparent, and a large umbrella-shaped tree is seen surmounting them all. You may anchor off the Government house.

To the north-westward of the entrance there are several patches of foul ground, and one dangerous reef, the *Niobe*, on which the sea breaks furiously. Its outer edge is a mile off shore, and bears N.W. by W. ½ W. 2½ miles from the southern houses of Grand Bassa settlement, so that vessels standing in should not bring them to the southward of E. by S. ½ S.

The *Nine Trees* stand, or stood, on an eminence above the town of Bullam, 3 miles or more to the westward of St. John's River, which river limits the Grain Coast on the West.

THE GRAIN OR PEPPER COAST.

The designation of the "Grain" Coast is derived from its being the source from whence the Grains of Paradise, Guinea Grains, or Malaguetta Pepper, is procured. This spice is chiefly used in England in veterinary medicines, and to give an artificial strength to spirits, &c. The St. John River, forming the western boundary of the Grain Coast, has been before described.

Waterhouse Bay.—To the southward of Grand Bassa the shore recedes a little, forming Waterhouse Bay, on the South side of Bassa Cove, full of detached rocks and reefs. The northernmost of them, the *Snapper*, lies nearly midway half a mile W.N.W. from Waterhouse Point, and always breaks.

From Grand Bassa Point the Dhouat ridge of rocks projects a quarter of a mile to the N.W., and at the same distance farther out a sunken reef, called the *Yellow Will*, assists in repelling the sea from the little nook called *Bassa Cove*, on which Fish Town is situated. *Bissaw River* runs into this cove, but it is inaccessible to boats.

Tobacannee.—About 4 miles S.E. by S. ½ S. from Grand Bassa Point is Tobacannee, a large native village; the coast in the interval being thickly wooded, and bounded by a waving line of small rocky points and sandy bays. Nearly a mile beyond the village is a low point with a projecting reef, which ends in the *Tobacannee Rock*; and about a mile W. by S. from the point there is a sunken rock, on which the sea constantly breaks. To the south-eastward the coast is rocky, with sandy bays between the points, fronted by numerous reefs, leaving a boat channel within them.

Young Sesters.—These reefs reach 8 miles along the coast, as far as *Trade Town*, but their continuity is broken midway at Young Sesters, a place with which trading vessels sometimes communicate. The same opening admits boats to pass inside of the reefs to *New Sess River*, the mouth of which is always accessible to canoes.

Continuing along the reef, you pass *Trade Town*, where some large magazines stand near the houses. Then follow *Great* and *Little Culloh*, or *Currow*, and *Tembo*. *Tobacco Mount*, 13 miles North of Tembo River, is 880 ft. high, and is a valuable land-mark. The line of the reefs, which is interrupted before these villages, re-appears to the South of *Manna*, the large black rocks of which are surrounded by shoals reaching two large miles off shore. When abreast of Tembo you will be able to make out, to the S.E., the magazines of the River Cestos. You may anchor in 6 to 8 fathoms, having the *Manna Rocks*, between North and N.N.W., avoiding to choose a berth to the southward.

GRAND CESTOS RIVER.—The entrance of the *River Sestros*, or *Grand Cestos*, lies in about lat. 5° 26½′ N., long. 9° 34½′ W., 40 miles S.E. by S. ½ S. from Grand Bassa Point. The mouth of the river is covered with rocks, of which several are above water, and half a mile from shore. You may anchor in 5 or 6 fathoms, with St. George Point, on which is a factory, bearing S.E., distant three-quarters of a mile, and Cestos Point bearing South. The river is navigable for boats as far as *King's Town*, the watering place in the rainy season, and more than 12 miles from the entrance.

Grand Cestos River offers the best position for a trading colony. It has been the site of the palm oil factories of the traders on that part of the coast; its bar affords about 9 ft. at high water. The roadstead for vessels gives better shelter than is to be found on a very long line of coast; so much so, that a vessel of 149 tons burthen was once hove down and coppered there. Palm oil in considerable quantity is produced in the neighbourhood. From the experience of the persons employed at the factories there, the climate appears, for the coast of Africa, healthy.

At the mouth of the Grand Cestos was formerly the Norman establishment of Grand Dieppe; the trees and village are on the left or East bank of the river, the village being hidden by the wood. In some positions the entrance may be distinguished by three hillocks, two of which are much larger than the third. The starboard point, on entering, terminates in a chain of reefs, which extend a long distance to the S.E., but you must close with them to enter the deepest part of the channel. On the opposite side are some sand-banks, which frequently break. The outermost rock on the starboard side is one of 12 ft., called *Spence Rock*, but to the S.E. of this one is reported of less than 11 ft. These are the more dangerous, inasmuch as they do not always break. A stranger should employ a pilot in entering the bay for the first time.

SANGWIN.—The entrance of Sangwin River is 20 miles S.E. by S. ½ S. from Grand Cestos. At 4½ miles north-westward from the entrance of Sangwin River is a factory formerly belonging to Mr. Spence, on the beach. Sangwin may be known by a large rock, 60 ft. high, called *Bai Yah*, or the *Devil's Rock*, with a bushy clump on the top, and lying at 1 mile from shore, and surrounded by dangers. Between the River Cestos and Sangwin, at 6½ miles from the former, is *Red Cestos*, known by some rocks which lie off it. Between the rocks and the beach you may anchor. Provisions and firewood may be got at Sangwin. Many detached rocks lie off this coast, as shown on the chart. *Baffou Bay*, which follows, is well sheltered from the South and S.E. *Baffou* may be known by having no large trees about it; some large rocks lie off the point, 1 mile N.W. ½ N. of which there is anchorage in 8 fathoms, sandy ground. In the northern part of the bay is *Baffou Rock*, 12 ft. under water, 2½ miles N.W. ¾ N. from Baffou Point, and 1½ mile off shore.

Settra Kru, a very large town on the beach, is 36 miles S.E. ½ S. from Sangwin. The greatest part of the ground between is foul; but a few spots are fit for anchorage. *Tassou*, or *Tahou*, is known by three rocks lying off it, between which and the shore you may anchor at 1 mile off. One of these rocks is pierced through in a singular manner. *Battoa*, or *Bootou*, appears, at a distance, like an island, and is known by its high land (266 feet) and bushy trees. Many detached shoals lie off this coast, as shown on the chart.

SINOU RIVER is, or was, known by a large single tree standing upon the pitch of the cape, to the eastward of which are some breakers. At half a mile W.N.W. of Bloobarra Point, on which is a small English factory, there is anchorage in 8 fathoms, sand. In the northern part of the bay are several reefs. Sinou makes like a long bay, extending North and South. Commander Lynch says of it (in 1853):—The anchorage is an exposed one for large vessels, but smaller ones find partial shelter from the S.W. winds, and its accompanying heavy sea, behind Bloobarra Point. The Sinou, a small but placid river, was selected by some American colonists who founded the town of *Greenville*, on the right bank, just above the river's mouth. It is the port of entry for the Sinou County. Above Greenville, which is regularly laid out, are the settlements of *Rossville* and *Readville*, subject to inundations. Rice is the principal food crop, palm oil being the chief export. Hereabout the easterly current sets, very commonly, 2 miles and more in the hour.

SETTRA KROU, &c.—Proceeding along the low sandy coast, a long, flat, black rock will be seen ahead, called *Kru Rock*, the largest and outermost of the rocks around it; it may be passed close-to, except to eastward, where it is connected to the shore by a reef. To the E.N.E. of it is the little village of *Little Kru*, where there is a palm-oil factory, and to the E. by S. the village of *Settra Kru*. Large, stout-built houses, used as European factories, stand in the middle of the latter village, and serve to distinguish it. The villages of *Krubah*, and *Great* and *Little Nanna Kru*, succeed. All these villages are occupied by that exceedingly useful race, the Krumen, or natives of the Kru coast. Off here the bank of soundings is considerably wider than it is either West or East of it; the 100-fathoms line being here fully 31 miles off shore, instead of 15 or 20 miles, as elsewhere.

Settra Kru is readily known, in clear weather, by the high and bare trees, which rise like masts of ships laid up. Off this place you may anchor in 16 or 15 fathoms, good sandy ground; but those bound to it must carefully avoid the dangerous reef, extending 2½ miles from shore to Kru Rock, and over which the sea breaks once in every 15 or 20 minutes. There is 6 fathoms close to it; 14 or 15 fathoms will carry you without it; but, by advancing to 12 fathoms, you may be aground. Numerous other detached shoals exist hereabout. At 13½ miles S.E. ¾ S. from the extremity of Krou Shoal is *Swallow Rock*, off Subono or Little Wappou, which is likewise covered. This shoal bears W. ½ N., 4 miles from the town, and N.W. ¾ W., 5½ miles from a large rock or islet, 2½ miles S. by E. of Wappou, called *Totwarah*, or *Flat Isle*. A sunken rock was reported, by H.M.S. *Sappho*, to lie 3½ miles S.W. from Flat Island. *Wappee*, or *Wappou*, is known by a single tree on the beach. There were two villages, Great and Little Wappee; the former has been destroyed.

At *King Will's Bay*, 6 miles N.W. ½ W. from Subono, are two small English palm-oil factories.

Neefoo, or Niffou, is 4 miles S.E. of Wappou, and consists of *Little*, *Middle*, and *Great Neefoo*; *Drou*, or *Droo River*, to the N.W. of the *Rio Dos Escravos*, or *Esereoos*, or Slave's River, is 5 miles beyond Little Niffou. Drou has been a place of good trade for ivory and Malagette pepper; but unless a boat is well manned and armed, it is dangerous to trade here. A rock lies off the mouth of the river, which may be entered by passing to the northward. *Baddou*, or the *Four Towns*, lies on the beach; the same caution is to be observed here as with the people of Drou. The coast about is entirely foul.

LITTLE and GRAND SESTERS (or Sestros) were formerly the Petit and Grand Paris of the Dieppe traders. The first is about 10 miles from Baddou, and the river on which it stands flows through a fertile plain, richly planted with palm trees. The second is divided from it by *Sesters Point*, which separates the plains. It is planted with some umbrella-topped trees, one of which is remarkable, and will point out the town. A mile off the point is a large black rock, called *The Carpenter*. Grand Sesters is on the East bank of the river of the same name, and there are two English factories here. You may anchor off the Carpenter in 12 fathoms, or with Factory Island bearing N.N.E. 1 mile distant, in 13 or 14 fathoms, mud.

The town of *Garraway*, a French settlement, is about 17 miles S.E. by E. of Grand Sesters. At 12 miles there is a remarkable ridge of trees, a good landmark. Garraway may be known by three hills on the West, with a clump of trees on its extreme southern point. You may anchor off it, to the southward, about 4 miles from shore, in 20 or 24 fathoms, good ground; but the coast off it is bordered by a reef. Garraway, and its road and river, were surveyed by MM. Bouet-Willaumez and De Langle; but although the little river is easy of entrance for boats, there are so few resources to be obtained, that it will be useless any further to describe the place.

It is high water, on full and change, at $5^h\ 45^m$; rise, 2½ ft. There are several villages at Garraway, and it may be recognised by a very distinct clump of trees, called Blackwill Trees, standing on a high hummock.

At 8 miles S.E. by S. of Garraway is the little negro town called *Rock Town*, within a point covered with trees, and which received its name from a dangerous reef of rocks, extending from it to the distance of 3 or 4 miles. Some of the rocks are above water. Between this place and the cape to the eastward is *Cape Palmas Little Town*. The large town is near the pitch of the cape. It has been recommended to those passing not to stand nearer to the coast hereabout than in 24 fathoms, the soundings within that depth being very irregular and the bottom foul.

In leaving the coast of Garraway, to double Cape Palmas, there are two routes to follow. The first is to pass between Fish Town and the North end of the reefs extending eastward of Coley Rock. The depth in the narrowest part of this channel is 5½ to 10 fathoms, rocky bottom; the width 1 mile. The current runs to E.S.E. at the rate of 2 knots, and often more, keeping the same velocity past Rock Town Point and Cape Palmas. This is by much the shortest route, and may be easily done while daylight lasts. But if it is intended to go South of Coley Rock, on quitting Garraway, make away for the West, in order to bear up against the prevalent East current and the West and

S.W. winds, and attain the depth of 90 fathoms before you bear off to the eastward, and must wait for daylight to pass Cape Palmas. In case of any doubt whatever, anchor without hesitation. *Fish Town* and *Rock Town* are built on two points, which form three slender bays, and terminate in black rocky heads. The heights are crowned with palm trees, and these and the woods give a very picturesque and varied aspect to the land.

CAPE PALMAS, &c.—Cape Palmas is nearly the southernmost land of all the coast of Guinea, and its extremity lies in lat. 4° 22′ N., long. 7° 44′ 16″ W. Captain John Lok, in 1554, the first Englishman who sailed along it, described it as "*Cape de las Palmas*, a fair high land; but having on the eastern side some low places by the shore, which look like red cliffs, with white streaks, resembling highways, each the length of a cable." It has been latterly described as a land moderately high, thickly wooded, with small hillocks and cliffs toward the sea, with red clay fissures resembling tracks or roads, and a large mud-walled town on the eastern elevation. Upon the promontory stands the missionary house beside the lighthouse. It is the only house plainly visible, the native towns being behind it, and covered in by trees. Cape Palmas is the great place for hiring Krumen.

LIGHTHOUSE.—On the western extremity of Cape Palmas is a lighthouse, 50 ft. high, showing a *fixed bright* light, at an elevation of 100 ft. above the sea; this light is not to be depended on.

To the southward is a narrow bluff island, called *Russwoun Island*.

At about 4 miles W.N.W. of Rocktown Point, and extending in nearly a *true* East and West direction, is the *Cape Shoal*. Between it and the shore there is 6 to 10 fathoms of water; and within it, near the latter, small vessels may anchor; but it is to be noticed that the current here sets with great velocity to the S.E. At about 2½ miles W. ½ S. of Cape Shoal is the rock called *Coley Rock*, which lies with the pitch of Cape Palmas, E.S.E., distant 9½ miles, and the remarkable tree at Garraway, N. ¼ E., 7½ miles. The least depth over it is from 6 to 10 ft., and it breaks in high winds; it tapers down to 7 fathoms all round, very close-to, and near it there is 13 fathoms. Cape Shoal is very dangerous; but having deep water all round, a fleet may pass between it and the land; but it must be remembered that the current sets strongly to the S.E.

Athol Rock.—There is, to the eastward of Cape Palmas, another sunken rock of 3¼ fathoms, upon which H.M.S. *Athol* struck, on the 16th December, 1830. From the rock Cape Palmas lighthouse bears N.W. ¼ N., distant 4¼ miles, and Growa Point, East, 3 miles.

The usual anchorage is on the West side of Cape Palmas, in 6 or 7 fathoms, on a line between Rock Town and the lighthouse, with the latter bearing S.E. ¼ E., distant 6 cables. Steam vessels sometimes anchor more under the cape, in 5 fathoms, but have been obliged to shift out, on rollers setting in. In May, 1873, the mail steamer *Yoruba* was lost here by striking on a rock of 1¾ fathom, 4½ cables W.N.W. from the lighthouse. Several other rocks exist in the vicinity of Cape Palmas, as shown on the chart.*

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* In November, 1879, H.M.S. *Firefly* made an exhaustive survey of the locality S.W. and westward of the Yoruba and Outer Rocks, when in search of two dangers reported by the steamers *Volta* and *Congo*, which are considered not to exist, as no traces of sunken dangers could be found in or near the positions assigned to them.

Harper.—There is a Liberian establishment, like that at Mesurado, Grand Bassa, &c., on the point of the cape. It is called *Harper*, and provisions, wood, water, &c., may be had here. You may pass close to the point, and anchor in front of the houses.

III.—THE IVORY OR TEETH COAST, FROM CAPE PALMAS TO THE ASSINI RIVER.

The chief places of trade are Cavally River, Bassa, Wappou, Bereby, Tabou, St. Andrew's Bay, Lagos River, Kotrou, the town of Lahou, Little and Grand Bassam, and Assini. The places in the neighbourhood of Cape Palmas abound in malagette pepper, rice, and grain. At the other places the chief commodities are ivory and palm oil; and of these the best stock has been commonly found at St. Andrew's and Lagos River.

In the offing, the winds, in the fine season, are generally from between the West and S.W. In the rainy season they are generally from S.S.W. The current to the eastward, 2 and 2½ miles in the hour.

CAVALLY.—At 6½ miles E.S.E. from Cape Palmas is a little town called *Gurrarwah*, *Gruway*, or *Growa*. In front of it is a reef, which plainly shows when the breeze has set in. After passing this point and village, you will see the first of the villages, called *Cavally*, distinguished by the name of *Little* or *Half Cavally*, and then other groups of villages of the same name; then the River Cavally, which will be made out when it bears North. Cavally Point is the southernmost land on this coast.

Cavally River may be entered to procure Krumen, or, still better, anchor off it. Provisions may be obtained at the villages, but communication is difficult. One Cavally village is situate on the eastern bank, and near the entrance of the river, on the opposite side of which is a reef extending seaward more than 1½ mile. There is good anchorage off the river in 20 fathoms. The river is navigable for boats. This place may be known by the two points at the river's mouth, which is wide and barred; though, in coming from the westward, you will not perceive the river till you are nearly to the S.E. of it. On the western point is a large native town, with a square church tower.

From Cavally River the coast trends about 2½ miles E.S.E. to a village, off which are four or five rocks, some of which are breakers, extending a mile out. The land all along is even, but appears to double when you are near the village; then, having passed two hummocks close to each other on the beach, you may see a low, flat point, projecting into the sea, which breaks very much upon it; this is *Tafou Point*. From Cavally Islet, about 3 miles eastward of Cavally River, to *Tafou Point* the sandy coast trends 8 miles in an easterly direction, with several villages on the coast, and dense forest inland. At Tafou Point the little *River Tabou* enters the sea, and here fresh water and wood may be easily procured with the consent of the native chiefs. The bar is usually smooth, and there is good anchorage in 7 fathoms, 2½ cables from its mouth. At 3 miles E. ½ N. from Tafou Point is *Tabou Point*. *Grand Tabou*, 1 mile N.E. of Tabou Point, is inhabited by a treacherous people, and traders should be on their guard

Between Tabou Point and the town of *Tahou* the land is considerably higher than that to the westward, and is varied with many hummocks, particularly within 18 miles of Tahou, where it is higher, near the coast, than any other seen between this and Cape Mount.

At the distance of 4½ miles E. ¾ N. from Tabou Point are the town and point of *Bassa* or *Basha*, off which several reefs extend to the eastward, nearly a mile off shore, and at 2 miles E. by S. from the point is a rock, on which H.M.S. *Penelope* struck in 1853. The coast then takes an E. ½ S. direction for 15 miles to *Half Bereby* or *Biriby*, between which and the *River Bereby*, or *Nahno*, 9 miles E.N.E., the coast is lined with reefs, extending upwards of a mile from shore. At 6 miles from Half Bereby, on the outer edge of this reef, is *Devil's Rock*, 45 ft. high, and of a whitish colour.

Grand Bereby, or *Kadahboo*, is situate on the margin of a bay, on which boats can generally land, as there is a projecting point which breaks off the sea; there is also a rock in the bay, called *Katum*, or *Devil's Rock*.

TAHOU is a collection of villages on the sandy shore between Grand Bereby and Tahou Point. The shore is rocky, but you may find good riding before it in from 14 to 12 fathoms, only taking care not to approach too near the rocks. Off it is *Brooni Rock*, which is visible at a distance. At half a mile W.S.W. of it is another reef, which breaks at 1½ mile off shore. The coast is thickly wooded and moderately high.

The RIVER SAN PEDRO, in long. 6° 38½′ W., falls into the small *Bay of San Pedro*, at its East side, the West limit being a point which shelters the bay during the dry season. The river was examined by Lieut. Fleuriot-de-Langle, in March, 1844, who named the projecting West point, *Point du Minou*. A little to the West of it are four rocks, three of which were called the *Three Caravelles*, the fourth, the *Malouine*. These break, as will be seen, in coming from the West, and the entrance of the river is marked by Point Minou. It must be brought to bear N.W. to open it. It is high water at $6^h 4^m$; rise, 6 ft. 6 inches. The village is on the beach between the Caravelles and Point Minou; the entrance has a depth of 10 ft. at half tide. In 1838, the entrance was entirely barred. The current outward is very rapid, but it was said that it might be ascended for several days. Wood and water may be got here.

Beyond San Pedro the coast rises abruptly from the sea to hills of a height of 350 to 517 ft. *Highland River* appears as if it might be frequented, as there was 6 ft. in the channel at low water.

ST. ANDREW'S BAY, 48 miles East from Tahou, is easily known by the *High Land of Drewin*, to the westward of it, the coast of which is very rocky in-shore, and some rocks extend a mile off, 2½ miles westward of the bay. Between St. Andrew's and St. Pedro Rivers are the towns of *Half* or *Little Drewin*, *Drewin*, and *Grand Drewin*, the first forming a small bay, 14½ miles from St. Pedro, and Grand Drewin, 5 miles West of St. Andrew's Bay. *St. Andrew* or *Sassandra River*, a considerable one, falls into the bay, but a heavy surf barred its entrance. A bluff point, 210 ft. high, on the West side of its entrance, is called *Swarton Corner;* and behind this, in the proper season, you may be supplied with wood and water. There is muddy ground at the river's mouth, and a black rock in the middle of it. Two large round-topped trees showed themselves above the land, at about 3 miles West of

Swarton Corner. The land of Drewin, which is an even table land, seems pretty high when near the shore.

Off the Bay of St. Andrew's is an excellent road, with 12 to 8 fathoms, fine sandy bottom, with the two trees before mentioned N.W. by N. From this spot are seen three high hills, the St. Andrew Hills, 938 ft. high, about 15 miles inland, appearing in one when the river is open; and, as to the eastward of the river there is a line of red cliffs, extending more than 12 miles, this place may be readily known. By giving the chief his *dash*, or present, water may be obtained here, and boats may proceed 6 or 7 miles up the river, if well armed; for the people are very cunning, bold, and treacherous. The common watering-place is at about 2½ miles up, on the eastern side. The bar of the river is very bad, and is the common entrance of the St. Andrew's and of the Tabetah Rivers. King George Town stands on Swarton Corner, the West side of the entrance.

For 3½ miles eastward of St. Andrew River the coast is generally very low, with a sandy beach; with the coast beyond it has a very beautiful appearance, having many negro huts, overshadowed with trees of every shade, red, green, and orange. At 5 miles E. ½ S. of the river is *Trepow*, and at 12 miles begins a series of large reddish cliffs, which are a good landmark for this coast, differing from the portions of coast to the West. The village of *Kotrou* is 4 miles E. by S. of the first of these cliffs.

If you anchor off Kotrou, the enormous canoes of the people will immediately put off with poultry, pigs, bananas, cocoa-nuts, &c. Tobacco is the most usual currency here.

River Frisco, or Rio de Lagos, is 31½ miles to the eastward of St. Andrew's River, and here water may be obtained. At the Frisco the red cliffs terminate. The villages here also offer abundance of eatables, and pigs are very plentiful.

Beyond the Frisco the coast is low and uniform, well wooded, and a lagoon extends parallel to the coast line as far as Apollonia, leaving a narrow slip of land half a mile broad, on which stand numerous villages. The high land forms an inner range as far as the Lahou villages.

LAHOU.—*Jack*, or *Picaniny Lahou*, is 14 miles E. by S. of the Frisco, and like all other towns here, is surrounded with a straw palisade, and planted palms. The low and uniform coast extends to *Half Lahou* and *Salt Town*, at 15 and 17 miles eastward of Picaniny Lahou. The town of Grand Lahou, a mile long, on the West side of the river of the same name, is the chief place of trade on the Quaqua coast, and one of the largest and most populous in these parts. Ships may ride before the town, as near the East shore as agreeable, in 8, 9, 10, 11, 12, and 14 fathoms, clay ground; but westward of the cape it is all mud, or sandy ground, with nearly the same depths of water. A fair trade is carried on in gold, ivory, and palm oil. The natives here and in the River Bonny use among themselves a coin known as the *manilla*, but all trade with Europeans is carried on by barter.

From the River Frisco, above mentioned, in long. 5° 33½′ W., lat. 5° 5′ N., the coast continues in one unvaried straight line, in a most remarkable manner, to Picaniny Bassam, in long. 3° 57′ W., lat. 5° 15′ N., a distance of 97 miles, the direction being E. by S. ½ S. (*E. ½ N. true*). From thence it trends in a line equally straight nearly to Axim, in long. 2° 15′ W., a distance of 106 miles, in the direction of S.E. by E. ¼ E. (*E. by S. true*).

Bottomless Pit.—Off Picaniny Bassam, where the coast changes its direction, is a tract of extraordinary depth. This gully is called the Bottomless Pit. Its general direction is *true* North and South, and its breadth from 1 to 2 miles. On each side of it there is from 40 to 70 fathoms; while at a quarter of a mile off shore there is no bottom with 100 fathoms, and at 2¼ miles is a depth of 256 fathoms. Beyond this it exceeds 200 fathoms, although on its edges, at 9 miles off-shore, there is only 50 fathoms. The bottom is generally a soft bluish mud.

The coast, which is generally low, comprises numerous villages, and the towns of *Jack Lahou*, *Jacque*, or *Jack-Jack*, *Ivory*, and *Half Ivory Towns*. *Picaniny Bassam*, *Gammou*, and *Grand Bassam*. The trade has been chiefly in gold and ivory, especially at the Bassams and Assini, the gold being reputed of a superior quality. Small cattle are also purchaseable, with fowls, yams, and palm oil. The produce of the last article is very great, and the season for it commences in September, after the *Gatoon Custom*, or harvest home.

The town of Jack Lahou is 27½ miles from Lahou. The land appears double for the first 6 miles of this extent. The natives between Half Jack and Cape Lahou are said to be very troublesome. At about 33 miles from Jack Lahou is Picaniny Bassam, on a steep shore, to the northward of the Bottomless Pit. Should you enter into 50 fathoms, you must anchor betimes, to avoid the danger of being driven on shore. The safest way for those trading here is to come-to a few miles to the eastward, where from 35 to 30 fathoms, with sandy bottom, may be found.

GRAND BASSAM.—From Picaniny Bassam to the mouth of the *River Sueiro de Costa* and Grand Bassam the coast trends 15½ miles S.E. by E. On advancing from the westward, the river may be easily known by the cliff or rock on the beach of its western point. The French factories, also, will be seen on its western bank. There is good anchorage off the river in from 12 to 9 fathoms, mud and clay bottom, at 2 miles off. Plenty of water and refreshments may be obtained here. The town is 3 miles above the entrance, and opposite to it the large river of *Aka* and *Akba* debouches. A very extensive lake penetrates the country to the North and West of Grand Bassam, one arm extending 16 miles to the North, and another to the West of Picaniny Bassam. These lakes were explored by the French ship *Serpent*, in 1848. The shores are densely peopled, and numerous small trading steamers ply on them.

Grand Bassam, or *Fort Nemours*, was acquired by M. le Comte Boüet-Willaumez, about 1843, and given up by the French in 1870. The factory, or Fort Nemours, is constructed on the extremity of the West shore of the river, consisting of a square palisade, with bastions, and four barracks for the garrison. There is good anchorage off the factory, in 11 to 14 fathoms. You can easily land, especially in the Senegal canoes, at the foot of the fort. The bar of the river, which is a very short distance East of the establishment, is narrow, and has a depth of 12 ft. at high water springs, and ships of moderate draught can readily clear it; once inside, there is 4½ fathoms water. Vessels of over 7 ft. draught should only attempt to cross under favourable circumstances, under the care of a pilot. The West winds assist the entrance, and the land breeze the leaving, of the river. The chief commerce of Grand Bassam is in palm oil and gold, either in ingots or dust, which are accounted the purest on the coast.

RIVER ASSINI.—Between Grand Bassam and the mouth of the Assini River the distance is 20 miles. The land about this place is low, but covered with high woods; and the river is now rather difficult to make out, being shut in by the trees; but it makes like a vista between the woods, which may be seen at a considerable distance. The current along shore hereabout sets rapidly to the eastward. You may anchor off the river in from 13 to 10 fathoms, sand and clay, at 1½ mile from the shore.

ASSINI, or Fort Joinville, was an old French establishment, dating from the time of Louis XIV., but long abandoned. It was again in the hands of the French from 1843 to 1870, when they gave it up.[*] It is now under British protection. The fort is similar to that of Grand Bassam; and gold is or was the chief object of trade. The river, after reaching the coast from the lagoons, turns at a right angle to the West, and after a course of 6 or 7 miles it debouches from behind a narrow, sandy tongue of land, which thus extends from its S.E. shore. The depth on the bar is about 10 ft. at low water; and is, therefore, accessible to ships of moderate draught, but the entrance is difficult to make out and to clear. It is frequently impassable even for canoes, but in fine weather small steam vessels drawing 4 ft. cross it. In coming from the West, the establishment will be seen, and may be known by three palm trees on the tongue of land separating the mouth of the river from the sea. Drifted by the current, as soon as these are made out, you must be ready to anchor in front of the factory. If you have cleared the bar, and worked up inside the river, you must also anchor before the factory.

At 7 miles eastward from the entrance of the river is the village and the French commercial factory, a white building with a red roof, and a flagstaff (now in the hands of Messrs. Swanzy), on a tongue of land which is a portion of the S.W. shore of the very extensive *Lake Aby*, which, with the *River Bia*, or *Krinjabo*, is navigable in the dry season for 35 miles in direct distance from the coast; and during the rainy season this river would probably afford means of penetrating a considerable distance in the interior.

From the S.E. part of Lake Aby the lagoon of Tendo runs parallel with the shore for 20 miles, at about 4 or 5 miles inland. The depths in it are from 2 to 14 fathoms. *Lake Eghi* joins this lagoon at the back of the village of *Albanee*, and is 15 miles long, N.N.E. and S.S.W. On its S.E. side the *River Tanoé*, or *Tendo*, enters it by five mouths, not one of which is navigable; but the small *Lake Uani* has access to it, by which the French steamer *Guet N'dar* entered, and ascended for 90 miles. Several new people, those of Anka and Afuma included, were thus visited, and their riches and commerce opened to European enterprise. The banks of the lakes and streams abound with enormous vegetation, and they may be navigated, as before stated, in all seasons.

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[*] The forts at Grand Bassam and Assini, belonging to the French, were let, in 1870, to the well known firm of Messrs. Swanzy. The French had withdrawn their troops from the coast although they had not formally handed the territory to Great Britain. In the inner waters of the lagoons, formed by the Assini and Tando Rivers, Messrs. Swanzy have some trading steamers.

IV.—THE GOLD COAST, EASTWARD, TO THE RIVER VOLTA.

The Gold Coast Settlements and Protected Territory of Great Britain are bounded on the South by the Gulf of Guinea, on the West from the coast in long. 3° 8′ W., along the shore of the River Tando, to lat. 6° 10′ N. To the westward of this the French settlements of Grand Bassam and Assini have been let to some British merchants.

On the East the boundary runs along the East bank of the River Volta at 1 mile from the stream to lat. 6° 20′ N., where it turns to the westward, the northern boundary being formed partly by the course of the rivers Prah and Ofim, northward of which lies the kingdom of Ashanti. This territory is divided into two portions by the course of the Busum (Sacred) Prah River.

To the westward of the Prah the kingdoms of Amanahea, Aowin, Ahanta, Wassaw, and the once powerful kingdom of Denkera, occupy the principal places among the protected tribes. Along the sea coast, *Apollonia* is the extreme western portion; *Ahanta* comes next; and the forts of Dixcove, Boutry, and Secondi, are within its territory: next comes the small state of Chama, at the mouth of the Prah, with the King of Elmina's territory on its eastern shore.*

To the eastward of the Prah the ancient Fanti kingdom,† extending along the sea coast from Sweet River to Mumford, is broken up into many petty states, each with a separate king, the Fanti king being almost powerless. This is the most civilised portion of the protected territory, much having been done by the missionaries. To the eastward, Ackoomfee and Gomoah, on the coast, are followed by Accra, North and N.W. from which is a mountainous region, where the Basle mission has its head quarters. Between Accra and the Volta are Inkran and Adamfi.

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* For further information respecting these kingdoms, the following may be consulted with advantage:—Bowdich's "Mission from Cape Coast Castle to Ashanti," 1819; Dupuis' "Journal of a Residence in Ashanti," 1824: Beecham's "Account of Ashanti and the Gold Coast," 1843; Cruickshank's "Eighteen Years on the Gold Coast of Africa," 1853; Major Ricketts' "Narrative of the Ashanti War," 1831; Miss Tucker's "Abbeokuta," 1853; Horton's "Physical and Medical Climate and Meteorology of the West Coast of Africa," 1867; Winwood Reade's "African Sketch Book," 1873; "Report of Committee of House of Commons," 1814; "Report of Committee of House of Commons," 1865; "Treaties, &c.," 1872; "Correspondence," 1872-3; "Ashanti and the Gold Coast," a Sketch: by Sir John Dalrymple Hay, Bart., 1874; and "From Cape Coast Castle to Coomassie," published by the Illustrated London News in March, 1874.

† The names of Ashanti and Fanti, the principal nations on this part of Africa, are derived by some from a tradition that they were both the same people originally, and being at war with Akim, they endured the greatest distress from hunger; the Ashantis found subsistence from a plant called Shan, and hence were called Shan didi, or eaters of Shan; the others were supported by a tree called Fan, and hence were named Fan didi. The verb, didi, to eat, is best expressed by the letters dti, which makes Shandti and Fandti, a close approximation to the national names. The European prefix A to Ashanti is never heard in the native pronunciation.—"Eighteen Years on the Gold Coast," by Brodie Cruickshank.

The following is a list of the forts along this coast, all belonging to the British :—

Apollonia, British till 1867, Dutch till 1872; *Axim*, *Fort St. Anthony*, Dutch till 1872; *Akoda*, *Fort Dorothea*, Dutch till 1872; *Dixcove*, British till 1867, Dutch till 1872; *Boutry*, Dutch till 1872; *Tacorady*, Dutch till 1872; *Secondi*, Dutch till 1872; *Chama*, Dutch till 1872; *Commenda*, British till 1867, Dutch till 1872; *St. George d'Elmina*, Dutch till 1872; *Cape Coast Castle*, British; *Nassau*, Dutch till 1867; *Anamaboe*, British; *Cormantine*, Dutch till 1867; *Apam*, Dutch till 1867; *Accra* (*Christiansborg*, formerly Danish; *Crèvecœur*, Dutch till 1867; *Fort James*, British); *Tassy*, *Fort Augustenborg*, formerly Danish; *Prampram*, *Fort Vernon*, British; *Ningo*, *Fort Fredensborg*, Danish; *Adda*, formerly Danish; *Quittah*, formerly Danish.

History.—A slight history of our possessions on the Gold Coast may not be out of place in this book. The first we read of the Guinea Coast is that in the year 1364 some French merchants of Dieppe traded hither, and in the year 1383 founded a small settlement at Elmina (Mina), which they were forced to abandon in the year 1441, in consequence of civil war at home. In 1481, the Portuguese, with 700 men, sent by King John of Portugal, after much opposition from the natives, succeeded in building the fort of St. George at Elmina. The subsequent discovery of America by Columbus, in 1492, caused an opening for the sale from this coast of slaves, the prisoners or convicts of the native rulers: hence the establishments of forts by several European powers.

The first British fort was built at Cormantine in the middle of the 17th century; and in 1662, the "Company of Royal Adventurers trading to Africa" was broken up by the Dutch, who took all our forts excepting Cape Coast Castle. Another company soon followed, under the title of "The Royal African Company of England," who proceeded to build new forts, thus coming in rivalry with the Dutch and the Danes, who had now gained a footing on this coast.

In 1752, "The African Company of Merchants" was formed, the jealousy and petty wars between the Dutch and English still continuing the same as it had previously been for nearly a century. This company remained in power until 1821, when, in consequence of the troubles caused by the invasions of the Ashantis into Fanti and other territory favourably disposed towards the British merchants, the Gold Coast possessions became a dependency of Sierra Leone, under Sir Charles McCarthy.

The Ashantis, allies of the Dutch, were now masters of the Fanti nation, and held the notes or leases of the lands on which the British forts were built. The tyranny of the Ashanti King over the Fantis, together with other annoyances, caused Sir Charles McCarthy to enter into a war. With a force of 500 men he reached Assamacow on the 21st of January, 1824, and there was met by 20,000 of the enemy. Deserted by most of his followers, he fell gallantly, together with his few English officers, fighting bravely to the last. Of the natives, only the King of Denkera and his followers remained true. The name of Sir Charles McCarthy is still famous among both Fantis and Ashantis.

It was not till the year 1826 that the Ashantis withdrew from our protected territory, when a serious defeat was inflicted on them by Colonel Purdon, with 10,000 men, at Doondowah, 25 miles N.E. of Accra.

In 1827, owing to the heavy expense incurred in war with the Ashantis, the English government withdrew all the public establishments from the coasts, and gave up the forts to the "African Company," to be held by them as factories, on the following conditions:—viz., that the two principal forts of Cape Coast Castle and Accra should remain dependencies of Sierra Leone; that British law should continue in force there; and that the affairs of the forts should be chiefly managed by a committee of merchants of London, appointed by the Government. The forts formerly occupied by the African Committee were the following:—Apollonia, Secondee, Commenda, Cormantine, Tantumquerry, Winebah, and Whydah.*

Mr. John Jackson was chosen president, but it was considered best to have an officer at the head of affairs in no way connected with trade, and Mr. George Maclean, an officer in the African corps, was appointed governor in 1830. Of the very difficult nature of this worthy gentleman's office, and of the excellent manner in which the national honour was maintained by him, it would be far too diffuse to speak here. The affairs of the Gold Coast were taken more immediately under the control of the Crown in 1844, and the governorship was given to Commander Hill, R.N., and Mr. Maclean's long and arduous services rewarded by a secondary place, which he fulfilled with the utmost probity, and entailed upon him the whole judicial administration of the country. He died at Cape Coast in May, 1847, amid the tears and lamentations of the natives, and the deep regrets and respect of the whole of the white population.* Captain Hill soon resigned his appointment to Captain Winniett, who, to subdue the atrocities of a monster, Quawe Accah, King of Apollonia, undertook an expedition against him, after he had killed the French commandant of Assini, &c.; and in April, 1848, he overtook his force, and took him prisoner. The expedition, though perhaps rash, being successful, procured the honour of knighthood for Governor Winniett. At this time the King of Denmark sold his forts on the Gold Coast for £10,000 to the English, who were considered to have a good bargain. They consisted of Fort Christansborg at Accra, and three minor stations, Ningo, Addah, and Quitta, the latter only being habitable. The possession of these, gained in 1851, gave to the English the government of the whole line of coast between Accra and the River Volta, and the control of the tribes subject to Denmark, and secured to us the advantages of the navigation of the Volta, and the resources of a country rich in palm trees, and an industrious population. Governor Sir William Winniett died at the end of 1851, without seeing the completion of his favourite scheme to make the colonies self-supporting.

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* To those trading on the coast it may be useful to know the meaning of the following words used in the Ashanti countries, &c., as they have been explained by the late Mr. Bowdich.

A Book or Note.—A certificate of a monthly pension, formerly paid by the African Committee to the Fanti chiefs in the neighbourhood of the British settlements, in consideration of their attachment, influence, and services; which books or notes have been claimed by the King of Ashanti, as his by right of conquest.

Caboceer, a chief, governor, or magistrate. Croom, or Kopi, a town or village. Custom, a festival, carnival, public ceremony, funeral rite, sacrifice. A Dash, a present. Palavar, a dispute, a debate, argument, or suit. Pynim, an elder or counsellor. To Panyar, to seize or kidnap. Stool, throne, seat in council, inheritance. Fetische, a charm, amulet, deity; any super-natural power or influence; anything sacred. A Fetische-man, a priest.

The System of Barter on all the coast is that termed the Ounce and Ackie Trade; every article of merchandize being estimated at so many ounces or ackies of gold: the former being the ounce troy, and the latter the sixteenth part of an ounce. The principal articles of export are gold, ivory, palm oil, gums, and pod-peppers. The cloths for the market must, generally speaking, be India, and those of the finest texture; for the extreme nicety of the black merchants, in their taste and choice, surpasses that of the most scrupulous and refined London tradesman. In receiving gold dust, it is requisite to have the assistance of a regular native *gold-taker*, from Cape Coast; as many have discovered, much to their sorrow and loss, that the filings of brass pans are not gold! See further on this subject, the injunctions in Lieut. Bold's book, page 57; and Adams's, page 104.

In 1865 the settlements, being in a very bad state, were again made a dependency of Sierra Leone, and in the year 1867 the British Government made exchanges with the Dutch: all forts East of the Sweet River, in long. 1° 15′ W., becoming English; and those to the westward Dutch. In this way, in 1867, 200,000 human beings were transferred from British to Dutch protection, much against their will, the consequence being rebellion against the Dutch authorities, who applied to Kofi Calcalli, the new King of Ashanti, for assistance in quelling the disturbances. King Kofi Calcalli, seeing a chance of regaining the prestige of his country, despatched an army, under his uncle Atjiempon, to assist in putting down the disaffected states.

In April, 1872, the British Government entirely changed its policy, by taking the whole of the Dutch possessions and protected territory into its own charge, giving in exchange the British possessions in Sumatra. Atjiempon, still in the country, was taken prisoner, and soon after sent back to Kumasi. Indignant at having been taken by the British, he persuaded the Ashanti King to make war on the British Protectorate.

Our forces on the Gold Coast, reduced for the sake of economy in 1869, now only numbered 160 men. Early in February, 1873, three Ashanti armies crossed the Prah, and invaded the Protected Territory. The kings and chiefs immediately applied to the administrator for arms, but no provision had been made to meet the emergency, which had been foreseen so long ago as 1869.

An attempt had been made, in 1871, to form a Fanti Confederation by the natives, for the purpose of governing the Protectorate, which was then in a miserable state of neglect; this the authorities would not recognise, and the Ashanti invasion found them without arms or any adequate means of defence. Early in March, 1873, the Ashanti invasion was recognised by Government, and in June (the enemy then being within 15 miles of Cape Coast Castle, and 12 miles from Elmina), Captain Freemantle arrived in H.M.S. *Barracouta*, the defeated Fantis at this time crowding under the forts for protection. On June 15th, the King's Town of Elmina, for supplying the Ashantis with arms, &c., was burnt, and 3,000 men attacked the British forces, consisting of 500 men, including seamen and marines, under Colonel Festing. With these forces the Ashanti army was totally defeated, and kept at bay until the arrival of Sir Garnet Wolseley.

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* Mrs. Maclean, the celebrated and accomplished lady of the governor, known to the world as L. E. L. (Letitia Elizabeth Landon), died at Cape Coast Castle, on the evening of the 15th of October, 1838. The circumstance of her death, as is well known, is enshrouded in a painful mystery, and has been made the subject of much misrepresentation. She and her husband were tenderly attached to each other, and they now lie side by side on that lone shore. Mr. Cruickshank, who was with her on the evening of her death, is of opinion she died from some sudden affection of the heart, and greatly doubts the facts or testimony that it was by her own seeking. An interesting account will be found in the 8th chapter of his first volume. See, also, Mr. Consul Hutchinson's "Impressions of Western Africa," pp. 60—62, where Mr. Cruickshank's statements are corroborated

Of the excellent way in which the expedition to Kumasi was carried out under his orders, and of the labours of Captain (now Sir John) Glover, in raising native forces on the Volta, we need not speak here.* The expedition started in October, 1873; Kumasi was burnt on February the 6th; and the troops withdrawn from the Gold Coast early in March, 1874; having taught the Ashantis a lesson not soon to be forgotten.

His Majesty Kofi Calcalli finally sent to Sir Garnet Wolseley, at Formannah, on February 13th, an urgent request for peace, with 1,000 ounces of gold as first instalment of the war indemnity. The Major-General, on behalf of Queen Victoria, accepted the humbled King's tardy submission.

The treaty of peace between the King of Ashanti and Great Britain obliges him to renounce for ever all tribute or homage from our protectorate provinces, or from the tribes of Elmina and other districts near the old Dutch forts on the coast. He promised the payment of 50,000 oz. of pure gold, a very small part of the cost he has obliged the British taxpayer to pay. It is understood that there shall always be freedom of trade and travelling on both sides between the seaports and the Ashanti kingdom, for which purpose a road, 15 ft. wide, is to be kept open and clear of bush from Cape Coast Castle to the Prah. Finally, "as Her Majesty's subjects and the people of Ashanti are henceforth to be friends for ever, the King, in order to prove the sincerity of his friendship for Queen Victoria, promises to use his best endeavours to check the practice of human sacrifice, with a view to hereafter putting an end to it altogether, as the practice is repugnant to the feelings of all Christian nations."

With regard to this war, Captain R. F. Burton says:—In 1872, Mr. Administrator Pope Hennessy, received from the last representative of Holland on the Gold Coast the whole of the territory last (1867) assigned to the Netherlanders. I at once foresaw that the Ashantis, who, since 1800, have persistently attempted to "make a beach," or establish a port, would resent the change of masters at Elmina—which they held virtually to be their own—and that the war, which had smouldered since 1863, would presently blaze up with renewed violence. Recalled from Damascus, I proposed to Mr. Swanzy, Mr. Reddle, and other influential West African merchants, to organise a mission to Ashanti; and it is still my belief that, with due prudence, such as requiring hostages, with the expenditure of £2,000 to £3,000 upon presents, and with the willingness to grant the great desideratum, this ugly affair might have been settled.

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* For full particulars of this expedition, see "The Story of the Ashantee Campaign," by Winwood Reade, the *Times* Special Correspondent, 1874. "Major Brackenbury's Ashantee War," and Mr. Boyle's "Fantee Land to Coomassie."

With regard to the future prosperity of the Protectorate, Mr. W. H. Simpson, Acting-Administrator on the Gold Coast, in his report for the year 1869, said:—"The people are docile, peaceable, and affectionate, and require only to be treated with kindness, gentleness, firmness, and strict impartiality, to make them willing to obey any orders or requirement that the Government may demand of them. The constant turmoils and troubles by which these settlements have become notorious should, I think, be ascribed to their position with relation to Ashanti."

Since the result of the Ashanti war, these troubles will probably cease, and a fair opportunity be given for the development of those resources with which these settlements are so prolifically endowed.

The aggregate population of the British Gold Coast territories in 1879 was about 500,000. The trade with the whole country in 1879 amounted to £323,039 imports, and £428,810 exports, considerably less than the single port of Lagos; the revenue for the same year was £90,432. In 1879, 89 sailing vessels, with a total tonnage of 24,057 tons, and 69 steamers, of 73,812 tonnage, almost all mail-steamers, entered. The Administrator is appointed by our Colonial Office to reside at Cape Coast Castle. He is assisted by a Collector of Customs, a Chief Magistrate, and his other colleagues, who form his Legislative Council. He acts, however, in subordination to the Governor-General of our West African settlements at Sierra Leone, more than 1,000 miles away. The only force at his disposal, in ordinary times, beyond a small native police, consists of a local Artillery corps and a detachment of the West India negro regiment from Sierra Leone.*

Slavery on the Gold Coast prevails to a great extent among the natives. Those slaves which are chiefly for domestic service, and not for prædial labour, are treated with mildness, and are, consequently, comparatively happy. The Fantis make no wars now to obtain their slaves; those which they hold are either born in bondage, or are what are called "slaves of the house," and are more leniently treated than others; or are purchased in the neighbouring countries, where the slave trade is still carried on; or they are taken in "pawn" either for the debts of others or themselves; and not being able to pay these debts, they lapse into slavery. The British Government is using its influence to procure the abolition of this system of slavery.

The native currency on the Gold Coast is, or rather was, the barbarous cowrie. They are now becoming obsolete upon the West African shores, though still highly prized in the interior. The following table may be useful:—

40 shells = 1 string.
5 strings = 1 tokoo (the seed of Abrus Precatorius).
10 strings = 6*d.* (the day labourer's hire in 1862, now increased to 1*s.* 3*d.*)
50 strings (2,000 cowries = 1 head) = 2*s.* 6*d.*, or the local half-crown. (The people will take silver money, but they object to it if at all worn.)

The coast forts and redoubts garrisoned by the Constabulary are:—Axim Fort, Dixcove Fort, Secondee Fort, Elmina Castle, Anamaboe Fort, Accra Fort, and Quittah Fort.

The following tables of the Fanti and Ashanti currency, compiled by the late Mr. Maclean, are founded upon the division of the ounce into 16 ackies, the ounce being worth £4, and the ackie 5*s*. Its accuracy is guaranteed by the well-known experience of the author :—

Table I.—Fanti Currency.

Names of Weights.	Weight in		Value.			Names of Weights.	Weight in		Value.		
	ozs.	ackies	£	s.	d.		ozs.	ackies	£	s.	d.
Pessua...............	—	1/48	0	0	1¼	Essien	—	6	1	10	0
Simpoah	—	1/24	0	0	2½	Acandjua	—	7	1	15	0
Takufan	—	1/12	0	0	5	Djua	½	8	2	0	0
Kokua...............	—	⅛	0	0	7½	Sul..	—	9	2	5	0
Taku	—	⅙	0	0	10	Sua-ne-sul.........	—	13½	3	7	6
Suafan...............	—	⅚	0	4	2	Djuamien	1	—	4	0	0
Meaton (or Giri-fan)	—	1	9	5	0	Essuanu..........	1	2	4	10	0
Sua	—	1⅔	0	8	4	Djuamiensan	1	8	6	0	0
Agiratjwi (or Gira)	—	2	0	10	0	Essuasan	1	11	6	15	0
Ensan	—	3	0	15	0	Bendah	2	—	8	0	0
Djuasul	—	4	1	0	0	Perigwan	2	4	9	0	0
Perisul	—	5	1	5	0	Entenu	4	8	18	0	0

Table II.—Ashanti Currency.

Names of Weights.	Weight in		Value.			Names of Weights.	Weight in		Value.		
	ozs.	ackies	£	s.	d.		ozs.	ackies	£	s.	d.
Pessua...............	—	1/64	0	0	1	Insuansan	—	2⅓	0	11	8
Damba	—	2/64	0	0	1⅞	Bodomu	—	2½	0	12	6
Takufan	—	4/64	0	0	3¾	Ensan...............	—	3	0	15	0
Taku	—	⅛	0	0	7½	Djuasul	—	3½	0	17	6
Taku-mienu	—	¼	0	1	3	Sul	—	4½	1	2	6
Takumiensan......	—	⅜	0	1	10½	Perisul	—	5	1	5	0
Suafan...............	—	¾	0	3	9	Essien	—	6	1	10	0
Dumafan............	—	22/24	0	4	7	Djua	—	7	1	15	0
Brofan...............	—	1	0	5	0	Anenfii	—	7⅚	1	19	2
Agiratjwifan	—	1 1/12	0	5	5	Esua	—	9	2	5	0
Insuansafan	—	1⅙	0	5	10	Suane-sul	—	13½	3	7	6
Bodorabufan	—	1⅓	0	6	8	Essua-nu	1	2	4	10	0
Sua	—	1½	0	7	6	Essua-san	1	11	6	15	0
Duma	—	1⅚	0	9	2	Essua-san-sul	2	—	8	0	0
Brofu	—	2	0	10	0	Perigwan	2	4	9	0	0
Agiratjwi	—	2⅙	0	10	10	Entenu	4	8	18	0	0

N.B.—An ackie is equal to 8 Ashanti takus, and to 9 Fanti takus. This table is extracted from "Ethnography of Akkra," &c., by W. F. Daniell, Esq., M.D., F.R.G.S., in Edin. New Philos. Journal, Vol. liii., 1852, pp. 129, 130.

DESCRIPTION OF THE COAST.—From the high land of Drewin, before described, to Apollonia, in long. 2° 35′ W., the country appears from the masthead extremely low; but towards and at Apollonia commences a range of hills, or what may be called an undulating country, which reaches to Barracoe. None of these hills have a greater elevation than 400 or 500 ft., and few are so high, except the *Devil's Hill*, near Winnebah, and *Ningo*. All are thickly wooded.

From Assini to Apollonia the distance is 42 miles S.E. by E. ½ E. At 24 miles eastward of the former lies *Albanee*, a little town on the beach, to the West of a square wood, close by the sea side. You may anchor between this town and Assini, in 13 and 14 fathoms, good ground. About 7 miles farther eastward lies *Tabo*, near the western side of an inaccessible river, called the *Gold River*, which has been a place of active trade.

Between Tabo and Cape Apollonia commences the undulating appearance of the country, interspersed with clumps of palm trees, which have been already noticed. Four eminences, in particular, distinguish the coast, and are conspicuous from the westward; but, in approaching, three only are commonly seen. These stand at an equal distance from each other, and stretch in a line along shore, having at a distance the appearance of a long projecting point, the highest being 284 ft. above the sea.

The ground about Cape Apollonia is foul. The only good anchorage is in 14 fathoms, the abandoned fort bearing N. ½ W., and the cape N.W. by N. ½ N. The ruins of the fort stand on the beach. The landing is very bad, and it is dangerous to cross otherwise than in the canoes of the natives. Neither wood nor water are to be obtained here, and very few refreshments, as limes and fowls, which may be had for shirts, &c. You land on the beach in the canoes from the factory, bringing your own boat to a grapnel short of the surf. A considerable quantity of gold-dust was formerly exported from here.

AXIM.– From Cape Apollonia to Axim the distance eastward is 21 miles. This was formerly the vice-presidency of, and first factory on, the coast possessed by the Dutch. The water here is very good, and runs from a spring; and boats land very easily behind some rocks. The mouth of the *Ankobar*, or *Seena River*, is about 2 miles westward of Axim. The entrance is apparently rocky, and very small, but is said to have a depth of 6 ft. on the bar at low water. Three black rocks lie to the eastward of the entrance, about 1½ mile from shore; the sea breaks heavily over them. The Ankobar River winds round the foot of the hills from a great distance inland, and pours out a considerable volume of water through an opening 300 yards wide, but so full of large stones and rocks that the canoes cannot venture out except in the most tranquil state of the surf. You may anchor in 8 fathoms, muddy bottom, with the fort E.N.E., distant 2 miles.

The two groups of houses, in the midst of which rises the Fort of Axim, seem to be very miserable, and offer but few resources in provisions. Water may be got from a well in a marsh behind a fort, but consequently is not good. The facility of communication seems to be the only advantage that Axim possesses, its trade having much fallen off of late years.

Of late, public attention has been called to the auriferous nature of the country in this vicinity, and several companies have been started to work the gold mines in the interior, which are reported to be very rich.

At 8 miles S.E. by S. of Axim are the ruins of *Fredericksburg*, or *Brandenburg Castle*, formerly a Dutch fort, now covered with trees and bushes.

CAPE THREE POINTS.—This projection, or promontory, as its name indicates, forms three headlands, ranging nearly true East and West. The middle one is properly the cape. The distance between the extremities is 3½ miles. When seen from the eastward or westward the cape appears as two hills, on the northern of which there is a tree known as the Cape Tree, and on the southern is situated the lighthouse. The land is even and moderately high, but the shore exceedingly rocky, except the interval of two sandy bays. The small town of *Tacramah* is between the West and middle points. The South extreme of the cape is in lat. 4° 44′ 50″ N., long. 2° 5′ 45″ W.

Light.—On the middle point of Cape Three Points is a white lighthouse, 20 ft. high, from which is shown a *fixed bright* light, elevated 75 feet.

The current here is extremely rapid, and commonly sets directly in upon the reefs, which are steep-to, and the ground without is rocky and foul. In passing, give the land a good offing, at least of 9 miles, and you will avoid all danger. *Cape Shoals*, with 2½ fathoms least water, lie three-quarters of a mile between W. by S. and S.W. by S. of the middle cape. To those bound to a roadstead eastward, it should be known that the current, beyond the cape, has carried many vessels bound to Cape Coast, or Anamaboe, &c., to leeward of their ports, and occasioned much trouble and delay in beating back again; but this may be avoided by proper caution.

Aquidah, or Akodah, a fort in ruins, stands on the beach upon a point 1½ mile E. by N. of the eastern point of Cape Three Points. Off this place you may anchor in from 14 to 24 fathoms, at the distance of 3 or 4 miles. Within a mile of the shore are several rocks.

DIXCOVE.—At 6 miles E. ½ N. of Aquidah, lies *Dixcove*, originally *Dick's Cove*, an English fort and settlement, and said to be as well situated for trade as any upon the coast; refreshments and water may be procured, but the natives object to wood being cut near the town. In approaching from sea the most conspicuous object is a building on high ground, North of the fort. The territory of Dixcove was obtained from the Ahanta tribe, who at present number about 30,000 or 35,000 souls. The Ahanta country begins at Prince's or Fredericksburgh, and ends near Secondi, nearly 40 miles of sea coast, and extends about 30 miles into the interior. Sufficient corn, &c., is cultivated for the use of the inhabitants, and the soil is generally considered fertile. Much gold, of a fine quality, has been obtained here. The natives are well disposed towards the English. Formerly British subjects on the Dixcove territory considered themselves quite apart from the rest of the Ahantas, who were Dutch, causing several wars.

There is a small sort of harbour, made by a reef of rocks, but which is fit only for boats and barks, and a fine landing. The fort is quadrangular, and built on a rising point of land: to anchor, you bring it North or N. by W., or even N.N.W., and the easternmost point of Cape Three Points W. ½ N.; then it is just in one with the westernmost point of the road. You lie in 15 fathoms of water, clear oazy ground. There is a current, which changes at uncertain periods. Water may be got conveniently, but it is very indifferent, being from a still pond. You land in a small cove on the West side of the fort, and roll the casks a small distance. If the commandant of the fort does not offer water from his tanks, it is better to go to Boutry for it. Unless the sea be very boisterous, this is one of the best landing-places on the coast, as small vessels, drawing 11 or 12 ft. of water, have been hauled on shore, cleaned, and repaired here. There is a rock in the middle of the cove, on either side of which you may pass.

Proceeding eastward from Dixcove you leave to port a black islet surrounded by reefs, called *Abbucore*, *Abokori*, or the *Sanco Stone*, which separates the anchorage of Dixcove from that of Boutry.

Boutry, or Bootry, a small Dutch fort, long since abandoned, and now used as a trading station, is 3 miles to the north-eastward of Dixcove, beyond the point of a small bay. Fowls, ducks, and corn may be obtained here, and there is good landing. The coast from Cape Three Points consists generally of a chain of hillocks, covered with wood. The village of *Bossua*, or *Bushau*, lies midway between Dixcove and Boutry.

Secondi, or *Secundee*, an insignificant place, lies 17 miles E. by N. of Dixcove. Between this and Boutry the Dutch had the fort of *Tacorady*, or Tacorary, now in ruins, and *Fort Orange*, about half a mile to the westward of Secondi. The last may be easily known, as the fort is built on a reddish point of land, with a low, sandy beach eastward and westward. The interior country, North of Tacorady, is called the *Adoom District*.

The coast, both East and West of Tacorady, is extremely rocky; and at the distance of a mile E.S.E. from the village, is a reef, one-third of a mile in diameter, that commonly breaks, although there is a depth of 4 fathoms close to it. In the night you should not approach it nearer than in 16 fathoms, and then with caution, as the current, in light winds, may set toward the shoal.

Roani Bank, on which the least depth is reported to be 6 ft., is about a mile long, and lies 4 miles S.E. by E. of Secondi. Between this and Abboaddi Point northward of it lies *Sherbro Bank*, of 19 ft., which sometimes breaks.

Chama, or *Assema*, distinguished by the fort of *St. Sebastian*, which stands behind the native town on rising ground, 300 yards from the beach, lies 6½ miles north-eastward from Secondi, and at a short distance south-westward from the mouth of the *Prah*, or St. John's River, where the largest and best canoes are made, and long boats may go in to get fresh water. The fort is rendered very unhealthy by the damps that come from the river.* Captain Adams says that Chama possesses much the same facilities as St. Andrew's (see page 576). The canoes made of the ceiba, or silk-cotton tree, are brought down the river, a little way from the interior, to Chama, and there sold. There is anchorage in 7 fathoms, sand and mud, with the fort bearing N.W., about 1¾ mile distant. After passing Chama, the coast is broken by some reddish cliffs, called *Cotobray;* and you will also see a second range of high lands behind them on the coast.

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* Mr. Bowdich says, "At six hours' pull up the Boosempra is an island, where Attobra, one of the Wassaw chiefs, who supplies the Dutch with canoes, has a large house; four hours above which is his croom. Colonel Stahrenberg was pulled three days up the river in a canoe; his progress was much impeded by rocks, and at length arrested by a large cataract, which, being considered a powerful fetishe by the natives, the canoe-men dared not to approach."

On August 14th, 1873, this place was the scene of an act of murderous treachery. The natives, who professed strict neutrality, fired upon a boat-load of our sailors, which had been upset in the surf while landing stores. For this act, Commodore Commorell, C.B. (who returned to his ship from a boat expedition up the Prah, where they had been attacked by the natives), ordered the place to be burnt, and in two hours the place was a heap of ruins.

RIVER PRAH.—The River Busum (*Sacred*) Prah is the western boundary of the *Fanti country*, and has a depth of only 2 ft. over its bar, which can be crossed by the natives in their canoes. *Prah Rock*, with only 6 ft. water over it, lies off the mouth of this river S.E. by S. ½ S., half a mile from the entrance, and E. ½ S. a mile from Chama Fort.

The *Fantis* are black as jet, muscular, and well formed; and those, says Capt. Adams, who are engaged in fishing, and employed as canoe-men, can endure much bodily fatigue, although they are apt to make excuses for abridging their labour. Their national mark is three small perpendicular incisions on each temple, and on the nape of the neck. In the construction of their dwellings and their canoes they exhibit much superiority over other African tribes. The women are well formed, and many are not wanting in personal beauty, as their features are small, their limbs finely rounded, their hands and feet small, and their teeth uniformly white and even. The women here, however, as well as in most other parts of Africa, sow and reap, grind corn, carry wood and water, and perform all the drudgery attendant on housekeeping, while the husbands are recreating or sleeping.

Commenda.—From off Chama you may see *Akatayki* (Ekky Tekky), or *Commenda*, which is 9 miles to the eastward, and where there are two small forts, formerly Dutch and English, both now abandoned. This place may be known by a small mount on the West, called *Gold Hill*. The coast near the forts is foul, and you should not approach nearer than in 9 fathoms. To anchor, bring the English fort to bear N.W., where you will have good sandy ground. A small native town stands near each fort, and landing can be made between them. The coast hence to Elmina, 8½ miles to E. ½ S., is for the most part bordered with reefs; the towns of *Ampenee* and *Akimfoo*, are situated nearly midway between.

ELMINA, or ST. GEORGE D'ELMINA.—The castle of St. George Del Mina, the first European fort on this coast, was built in 1481 by the Portuguese. King John of Portugal sent out three vessels laden with the stones ready formed, which only required fitting together with cement by 100 masons who were sent at the same time. It remained in the hands of the Portuguese till the year 1637, when, after several unsuccessful attempts, the Dutch became possessed of it, and held it in possession till the year 1872. It was then formally ceded to Great Britain, together with the other Dutch possessions on the Gold Coast. It was the closing of this port to the Ashantis, by the transfer to the British, in 1872, which served, in a great measure, to bring about the late war. The Ashantis, although passing through two hostile tribes, having always enjoyed free trade in this port.*

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* Early in June, 1873, it was found that "King's Town," separated by the river from the commercial Port of Elmina, was furnishing our enemy, who were lurking in the bush

Elmina is readily known by the high and double walls of Fort St. George, and the fortifications of Fort St. James or St. Iago, now a prison, standing on a height behind Fort St. George. The town of Elmina is divided into two portions. One is built beneath the guns of the fort, on the peninsula formed by a small river, *Beyeh River*, and consists of a mass of filthy negro huts, separated by streets or lanes, not less dirty. The other part rises from the left bank of the small river, and is connected with it by a bridge, the river thence to the sea being confined between two stone embankments; it consists of a good number of European houses, and negro huts less dirty than those of the other part. A pleasant promenade and public garden render a visit or a residence at this place very agreeable. Previous to the revolt and destruction of King's Town, Elmina was reckoned to have 15,000 inhabitants.

Water may be got at Elmina, but should be procured from the cisterns of the fort. Provisions of all sorts may be got, even bullocks, but they are very dear. It is best to use the native boats to land or embark, as the ship's boats cannot land at other times than high water, on account of the shallowness of the small river which penetrates the town.

The usual anchorage off Elmina is in 7 or 8 fathoms, sand, or shells and mud, with St. George Castle bearing N.W. ½ W. distant about a mile; or with Mount Eguoffo well open eastward of Fort St. Jago; if necessary, a vessel may anchor for the night in 13 fathoms, 5 miles off the land, between Elmina and Cape Coast Castle.

CAPE COAST CASTLE.—From St. George d'Elmina you see Cape Coast Castle, 7 miles to the E. ½ S. The town of Cape Coast Castle has a population of about 10,000, of whom scarcely twenty are Europeans. There is no harbour, but an open roadstead, with a rather difficult landing-place behind a reef of rocks, under the N.E. bastion of the Castle. This is a vast irregular range of buildings, covering several acres, and enclosing a triangular parade ground. It stands upon the extremity of a ledge of gneiss and mica slate rock, which stretches 50 yards into the sea. On one side are the Government offices and Council Chamber, and a gallery, paved with black and white marble. Some of the buildings are lofty, with four stories. On the other sides are the court-house for trials, the garrison officers' quarters, the soldiers' barracks, and bastions mounted with guns. It has several spacious water tanks. In the drill-yard are the graves and mural tablet of Mr. Maclean and his wife, who as L. E. L. (Letitia Elizabeth Landon), had gained some literary fame.

The town extends a mile inland from the esplanade of the Castle. Its two principal streets are wide, and are planted, like boulevards, with wild fig or "umbrella trees," bearing a large yellow flower, along each side. The better class of houses are of substantial brick, two-storied, flat-roofed, whitewashed, and fitted with green shutters or sunblinds. The Episcopalian Church and the Wesleyan Chapel are the most conspicuous public buildings. The poorer

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around Elmina, with arms, &c. A summons was issued to the rebellious natives to give up the arms and ammunition they held for the Ashantis; this order was disobeyed. After a second summons, and a few hours' grace, the so-called King's Town was bombarded from the boats and castle batteries, and afterwards fired and totally destroyed.

quarter of the town is a huddled collection of native cottages, or rather hovels, along the opposite slopes of a deep ravine, through which a filthy torrent-sewer flows in the rainy season. These wretched dwellings, built of mud or unwrought clay and thatched with reeds, are often destroyed by the heavy rains of West Africa. Outside the town, upon the neighbouring hills, are several forts or towers, mounted with guns; these are *Fort William*, with the lighthouse near it, 200 ft. above the sea; *Fort Victoria*, to the N.W.; and *Fort Macarthy*. To the N.E. is *Connor Hill*, a healthy site for a military hospital; but to the West of this lies a salt lagoon, which cannot have a very salubrious effect. Near it is a large garden, belonging to the Wesleyan Mission House. The country inland from Cape Coast Castle presents a billowy expanse of small round, conical, or flat-topped hills, thickly covered with trees and bushes, through which, beyond Fort Napoleon and Beulah, two or three narrow footpaths wind towards the North.

The climate in the vicinity is described as generally more healthy than other parts; but even here, from June to September, during the rains and exhalations, it is pernicious. When the sea is calm, water may be obtained here by coming to a grapnel at a little way from shore, as black boys may be engaged to swim the casks to and from the boats; but as the water is collected and preserved in tanks, it is in the dry season bad and unfit for use.

Of this place, it has been said by Captain Adams, "The Gold Coast is nearly, if not quite, as unhealthy as Sierra Leone; and if the gentlemen sent out to Cape Coast Castle were lodged, on their first arrival from Europe, 1 mile in the interior of the country, instead of within the walls of that castle, the fact would too soon be fatally realized.

"The superior healthfulness of the castle itself may be accounted for by its southern rampart wall being built upon a ledge of rocks which project a little way into the sea, and against which rocks the sea beats with great violence; thereby creating, at all times, a cool and refreshing current of air within the Castle. The sea breeze also blows directly into it, pure as the element over which it wings its course; and, at some seasons of the year, this breeze continues blowing days and nights without intermission."

It was also said, by a physician, Dr. Barry, that no cultivation, no sanitary regulations will ever render these settlements congenial to European constitutions, particularly to the common soldier, whose irregular habits are too strongly confirmed ever to be eradicated.

"It would appear, from the examination of Mr. President Maclean, that the prevailing diseases of which Europeans die at Cape Coast Castle are remittent or intermittent fevers and dysentery. The majority of Europeans are generally taken off between the ages of 18 and 30. This locality is considered healthy when compared with Jamaica, Cuba, or Barbadoes. The most sickly part of the year is from the 20th of July to the 20th of September. The remittent and intermittent fevers which prevail during these months (May, June, July, and August) are generally more fatal to those who have arrived from Europe late in life, than those who arrive out young.

In former years, it was stated that several vessels bound to Cape Coast Castle, &c., had run past their port from mistaking Cape Coast Castle for Elmina, and Anamaboe for Cape Coast Castle, which could scarcely happen now, the forts forming good marks. It is the more important to recognise the marks from the consideration that, if a vessel gets too far to leeward, she cannot get back for a considerable time, nor without difficulty.

The North bastion of Cape Coast Castle, according to Captain Vidal, is in lat. 5° 6′ 10″ N., long. 1° 13′ 51″ W.

The **LIGHTHOUSE** at Fort William, 600 yards inland, is a white circular stone tower, 46 ft. high, showing a *fixed bright* light, elevated 192 ft. above the sea, and visible 12 miles in every direction seaward.

In steering for the anchorage of Cape Coast Castle, vessels ought to bring the light to bear N. ¾ W., keeping the lead going, and to anchor in 6½ or 7½ fathoms of water; the light being then distant about 1¼ mile. For large vessels, at *night*, 7 or 7½ fathoms is near enough to the beach.

In ordinary weather the light will be of great service in preventing vessels being carried to leeward of their port by the strong south-easterly current, which runs off the coast about 10 months in the year.

A good and very convenient berth is in 7 fathoms of water, with the lighthouse on with the highest part of the large black rock under the castle, distant off-shore about 1¼ mile. In the rainy season it is more prudent to anchor in 10 fathoms, with the Castle and Fort William in line, bearing N. by W. ½ W., the castle being about 1½ mile distant. A *time ball* has been established here, the notice and description of which are subjoined below.*

The *bearings from the anchorage* in Cape Coast Castle Roads, as taken on board H.M. schooner *Prince Regent*, lying in 8 fathoms, bottom of stiff mud, were—the Castle flagstaff N.N.W., distant 1½ mile, in a line with the hall of the Castle and Smith's Tower; Elmina Castle W. by N., 9 miles; Queen Anne's Point N.E., 3 miles; and Anamaboe Point E. by N., about 10 miles.

ANAMABOE.—In sailing from Cape Coast Castle toward Anamaboe, 8¼ miles to E. by N., the remains of *Mauree*, or *Moree*, and the Dutch Fort *Nassau*, will be seen. Here you will have regular soundings of 8 and 9 fathoms, at about 2 miles off shore. Anamaboe Fort is a small square fortification, with four bastions and four curtain walls, mounting 27 guns, lying low on the beach; and it cannot, if the preceding description be attended to, be mistaken for Cape Coast Castle.

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* CAPE COAST CASTLE.—A notice, dated Hydrographic Office, Admiralty, 1st November, 1839, states that, at Cape Coast Castle, all vessels in the Roads may ascertain the errors and rates of their chronometers, without exposing them to the risk of being carried on shore through the surf.

A flagstaff, with a gaff, has been erected on the southern turret of the Castle: and at $11^h\ 30^m$ mean time, on every day, a red flag, with a white ball in the centre, will be hoisted at the head, as a preparatory signal.

At $11^h\ 55^m$, Greenwich time, a black ball, 5 ft. in diameter, will be hoisted at the gaff-end, and the flag lowered, and, at the instant of noon, Greenwich mean time, the ball will be dropped from the end of the gaff, and will immediately disappear.

As the falling of the ball will occupy more than a second of time, the instant of noon is to be reckoned from the separation of the ball from the gaff.

The latitude of the flagstaff, as given in the notice by Geo. Maclean, Esq., President of the Council, is 5° 5′ 25″ N., and its longitude 1° 12′ 5″ W. Capt. Vidal gives the North Bastion in long. 1° 13′ 51″, as above. Capt. W. F. Owen had previously given it in 1° 18′, or 5′ eastward of the position before assigned to it.

The only thing in the neighbourhood of Anamaboe worth mentioning as a sign either of improvement or enterprise, is a good road for about 10 or 12 miles into the interior, made by an intelligent merchant named Barns, for the purpose of conveying timber to the coast.

Anamaboe Town contains 6,000 inhabitants; but the whole of the Fanti, and other towns under this fort, might amount to 50,000. The soil along the sea-board is poor, but improves as you advance into the interior. Indian corn, yams, cassada, plantains, &c., are grown; not one-thousandth part of the land is under cultivation, but it is on the increase. There are several large native towns in the interior, from 12 to 40 miles distant. The fort is in tolerable repair, and garrisoned with a few soldiers. It is better adapted for trade with Ashanti than Cape Coast; and it is thought that in a few years Anamaboe will have the greater part of the trade of the Gold Coast. The trade is principally carried on in London and Bristol ships. The legal trade with the natives has increased greatly.

There is anchorage at Anamaboe, directly before the town, in 7½ fathoms, with Cormantine Fort N.N.E. You may anchor in the same depth, with the flagstaff of Anamaboe Fort N. by W. ¾ W., in line with the westernmost of the Cormantine Mountains, the chain of high land seen inland to the right. The latter is considered as the best berth. Wood, water, and provisions may be obtained here.

Cormantine, the first fort possessed by the English, was built by them about the middle of the 17th century. It was taken afterwards by the Dutch, and some years ago was almost destroyed by the Ashanti army before it attacked Anamaboe. It is situated upon a hill, 2 miles E. by N. ½ N. of Anamaboe, and affords the pleasantest prospect on the whole coast. You may anchor off it in 7 fathoms, the fort bearing nearly N.W.

The land hereabout is generally bare, with some bushes; hills are visible in the background from time to time, some of which are in the form of sugar-loaves. The coast from Anamaboe to Tantumquerry is a straight line on the same parallel, and off it the depth is less than elsewhere. Several villages are scattered along it, where there is no doubt that refreshments might be got.

"The fort of Little Cormantine is one of the best positions on the whole of the African coast. It is built on a perpendicular rock, 100 ft. high, washed at its base by the sea. The village is a wretched *kroom*, as villages are termed, containing 500 or 600 inhabitants, who live chiefly by catching fish, which they carry to Anamaboe. Cormantine, a large native town about a mile E.N.E. of the fort, is in a very grand and romantic situation. It is more regularly built than Little Cormantine."—*Duncan.*

To the eastward of this are some other villages, near to one of which are the slight remains of Fort Amokou, formerly held by the French. There is a trading station at Salt Pond Town near it.

Tantumquerry Point is 17 miles E. by S. ¼ S., from Cormantine, and the abandoned British Fort is just to the north-eastward of it. The coast eastward of the point is foul, and there is a reef off shore. Off the fort you may anchor in 9 fathoms. The shore eastward turns abruptly to E.N.E., and at

3¾ miles are the ruins of *Monfort*, which make like an islet. Some houses near it are called *Gammah*. *Apam*, the abandoned Dutch settlement, lies 2¼ miles farther on.

At 4 miles eastward of Apam is *Mamquady* or the *Devil's Hill*, a conspicuous mountain, 670 ft. high, close to the shore. Near this hill the anchoring ground is very good in 8 or 10 fathoms, with the hill bearing N.W.; but in 18 or 20 fathoms the ground is very foul.

Winnebah, or *Simpah*, formerly distinguished by an English fort, is 13 miles E. by N. ¼ N. of Tantumqucrry; the fort was abandoned and destroyed in 1812. The town stands on the beach of a small bay on the eastern side of the point, and above the town are the ruins of the fort. Two whitewashed trading-houses on the point, are easily seen when approaching from the westward. At low water the landing here is good for canoes, being sheltered by the reefs off the point, which are then uncovered; but at high water it is very difficult.

From Winnebah there is a communicating path to the commercial town of *Kibbees*, in the country of the gold mines; and on the East is the small River Ayhnsoo, the water of which is good, if filled at a proper distance from the sea. The natives require a small duty for watering.

Barracoe, or *Seniah*, having a small fort abandoned by the Dutch, is situated on the side of a woody hill, with some rocks before it, at 8½ miles E. ¼ N. of Winnebah. It is easily known by the double hill, 770 ft. high, called the *Paps*, which stands inland, at 9 miles to the North (*true*) of it.

From Barracoe the coast, slightly inflected, trends E. ¾ N., 19 miles to *Accra*, or *Inkran*,* and about 7 miles westward from that place is a small stream called the *River Sakkoom*, with a village of that name on the eastern side; and 3½ miles westward of it is a little round hill called the *Cook's Loaf*. Having passed this you will descry the high mountains inland, called the *Tafou Mountains;* then you get even land of a moderate height, as far as Accra.

ACCRA, or Akkrah.—The town spreads to the N.E. and N.W. of the fort occupied by a West India regiment; it consists of several narrow streets of native dwellings, but it can also boast of some good houses belonging to the English merchants. Water, cattle, small stock, fruit, vegetables, and other supplies may be obtained at Accra, but application should immediately be made to some merchant of respectability. Fish may be caught in plenty at the anchorage.

At a mile South of Accra there will be found a depth of 5 fathoms; at 1½ mile, 7 fathoms; and at 2 miles, 8 to 9 fathoms. During the dry season, vessels may anchor in 5 or 6 fathoms, but during the rains it will be prudent not to approach nearer than 8 fathoms. H.M.S. *Narcissus*, in February, anchored in 6½ fathoms, sand, with Fort James bearing N. ½ E., distant 2 miles; eastward of this the ground is foul.

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* The Portuguese first settled at Accra, about 1492; but exercising the greatest cruelties and enormities, were extirpated by the Accras, who executed the governor and his countrymen, on a spot whence they still take the earth to rub on a new-born child, in commemoration of the event.—*Bowdich.*

This place has been described as the most pleasant and healthy British settlement on the West Coast of Africa.

The landing at the Castle Point, which is usually effected under the imperfect shelter of the rocks, is very difficult, and seldom attempted, except by the natives in their canoes.

The merchants of British and Danish Accra have made a handsome road between those places, with trees on each side, which render it an agreeable walk or drive.

The LIGHTHOUSE is a red temporary building, standing on the West bastion of Fort James. It shows a *fixed bright* light, elevated 50 ft. above the sea, and visible 10 miles. It is intended to erect a light-tower.

Under the Basle Mission a road was steadily progressing from Accra to Acropong, a distance of 45 miles. The Wesleyan and Basle Missions have settlements in the mountains of Aquapim, and have done much to civilize the natives around Accra. A new wharf was also reported as completed at Accra.

The actual extent of territory belonging to the British at Accra, previous to the purchase of the Danish Fort, was very limited; but the influence extended a great way, say to Winnebah, 20 miles to windward; to leeward, the Danes had all, excepting Pram Pram, about 20 miles from this. There were no towns in the neighbourhood, except the Dutch adjoining, and the Danish about 2 miles to leeward; there are other considerable towns in the interior. The black population amounts to about 3,000.*

It is to Dr. William Frederick Daniell, of the Army Medical Staff, that we owe by far the most complete account of the natives, customs, and capabilities of Accra or Akkrah, as well as of other portions of the Gold Coast. From his communication to the Ethnological Society of London, we derive the following:—

The Akkrahs at present only occupy a territory between the Sakkoom eastward to the small town of Tashia, not more than 15 miles in extent. From the Sakkoom westward the confines are formed by the numerous Fanté provinces; on the North the two tributary kingdoms of Akim and Acquapim; to East and N.E. the Adampé, Aquamba, and Krepe races predominate. This small tract of coast is called by the natives *Ghân or Ghà*, very difficult of pronunciation. By the Fanté and other Inta nations, it has been called *Inkran* and *Inkara*, a term perhaps derived from the numerous ant hills which abound here. The principal towns are three, N'glish or English Accra, Kinka or Dutch Accra, the largest and most ancient, and Ossu or Danish Accra.

"The country in the neighbourhood of these towns presents a pleasing and diversified aspect, stretching far and wide; a succession of long and verdant uplands gradually emerge from the coast, which, as they ascend inland, become broken into a variety of gentle undulations and continuous slopes, adorned by a woodland scenery, extremely beautiful and picturesque. Advancing still deeper into the interior, these in time partake of a more mingled character, and are ultimately blended with the elevated mounts and prominent highlands visible in the distance. In these localities the soil is exceedingly rich and fertile, the native plantations or farms producing, almost without the aid of human labour, that abundance of food which so bountifully supplies the necessities of all ranks of life.

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* Accra is famous for its goldsmiths' work. "The artificers at the goldsmiths' shops are all native negoes, taught the art, no doubt, by the Spanish and Portuguese original settlers of those nations. A score of them at work in a shop would really be a picture worthy the pencil of Loraine. Some assaying, some melting, others blowing fires with small bellows, more hammering on Lilliputian anvils; others portioning with charcoal, and more fashioning chains for rings or bracelets. As the majority of them are poor, the gold is generally brought by those who want to get the ornament fabricated, which can be done to any design or pattern."—*Hutchinson's Impressions of Western Africa*, p. 69.

"In the lowland regions adjoining the ocean, the land is partially divested of those primeval forests and luxurious underwood observed in other parts of the coast, and somewhat resembles one of those irregular prairies of Southern Africa, which, clothed with lank grass and a few flowers, are dotted at intervals by isolated thickets and occasional clumps of trees."*

Beulah Gardens is a station on the Seccoom River, 8 miles N.W. from Accra, and 6 miles from the sea. Canoes may reach it in 3 hours from the sea. The Rev. Thomas Freeman, the proprietor, came to this coast in 1838 as a missionary, and was afterwards known as the "Bishop of the Gold Coast." Captain Burton, who visited this place in 1862, says: Mr. Freeman began work about the end of 1859, and by degrees he has reclaimed fourteen acres, of which eight are under coffee, despite the plague of lizards. He can extend along the Seccoom River *ad libitum*, and he proposes to breed stock on the right or western bank. Meanwhile he grows manioc, maize, and groundnuts (*Arachis hypogœna*); peppers and sugar-cane upon the wet banks; radishes and rhubarb; plantains and papaws; cabbages, cucumbers, and "kullaloo," an excellent West Indian spinach.

M. le Comte Bouet-Willaumez thus describes Accra:—Within the space of 2 miles stand the three forts of Akra: the first is the English; the second the Dutch, an abandoned ruin; and the third the Danish. The English fort of St. James is recognizable by the whiteness of its walls; three tall palm trees, a mile westward of the fort, also serve to distinguish it. You may anchor to the S.S.E. of the fort flagstaff in 6 or 7 fathoms, about a mile off, on a flat of fine sand. Fort St. James is an irregular square, flanked by bastions. The European houses are spacious and comfortable, and groups of houses extend around the fort. Fresh provisions of all sorts are to be had at more reasonable rates than those to westward. Water can hardly be got but from the cisterns of the fort. The landing-place is not always accessible to boats, so that canoes are best.

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* On the Ethnography of Akkrah and Adampé, Gold Coast, Western Africa, by the late William F. Daniell, M.D., F.R.G.S., Assistant-Surgeon to the Forces, &c.; in the Edinburgh New Philosophical Journal, 1852, Vol. lii., p. 289 et seq.: Vol. liii., p. 120, and p. 333 et seq.

Captain R. F. Burton, speaking of the wealth of the surrounding country, says:—Fresh from "Californy," I determined to "prospect" the placers of "that golden country," as Barbot calls the land about Accra, and to ride over the leeward districts, which begin with the Seccoom River (W. long. 19′ 30″), about 6 direct miles West of Fort James (Accra), and extend eastward some 62 direct geographical miles as far as the Volta, in E. longitude 42′ 18″. I may generally state my conviction that the country is a mine of wealth, and I volunteered, if made "Administrator," to send home one million sterling the first year, and double that sum during the future.

Leaving Fort St. James, you pass before the ruins of the Dutch Fort of Crêvecœur, about 650 yards from Fort St. James; you may anchor off its flagstaff in 5 or 6 fathoms water, a mile distant, but in the stormy season it is better to do so farther off. *Fort Christiansborg*, the principal of the Danish establishments, is a strong citadel, attesting the ancient maritime splendour of Denmark; it is now converted into a residence for the Governor of the Gold Coast. Near the fort is a very populous village, intersected by very dirty lanes. The market (well described by Dr. Daniell) is the best of any among the European establishments, and may be reached by horse or carriage from St. James' by a good and well-kept road. A road for wheeled vehicles has also been constructed to Aburi, the Government Sanitorium, a distance of 26 miles.

In 1863 the three towns were much damaged by an earthquake.

Some care is required in choosing an anchorage, for a French ship nearly lost an anchor in 1863, by dropping it on a rocky bottom, which was covered with sandy mud. From the spot the English flagstaff bore N. 27° W., the Dutch Fort N. 16° W., and Christiansborg Fort N. 32° E., by compass, and the depth 7 fathoms.

Caution.—Mr. Finlaison says that those leaving Cape Coast Castle for Accra should be very careful that they do not overrun their distance; for if they should happen to get to leeward, it will take them some time before they work back against the swell of the sea and strong current. He recommends that, if a ship leaves Cape Coast in the night time, she should not run more than two-thirds of the distance.

At Accra the tide rises 6 ft., on spring tides; it is high water, on full and change, at about $4^h\ 45^m$. The current sets, in general, to the eastward, except in the Harmattan season, which is about the middle of January.

Beyond Christiansborg, 12 miles distant, is the ruined Danish Fort of *Temma;* 5 miles farther is that of *Ponee;* the latter ruins being on a high hillock. The land continues to be arid, bare, and only clothed with low bushes. At 5 miles eastward of Christiansborg is the large native town of *Tassy*, with the ruins of Fort Augustenborg westward of it.

Pram Pram, 3½ miles eastward of Ponee, is a considerable native village; two large whitewashed houses stand on the hill, which overlooks the site of the ruined English Fort Vernon. Should you anchor before this, it is necessary to sound carefully to avoid the rocky ledge of 5 to 6 fathoms, called *Vernon Bank*, which extends 12 miles E. by S. from the shore southward of Ponee, to 3½ miles off at its East end.

Ningo Grande.—At 4½ miles E. by N. from Pram Pram is Nuno, Noyo, or Ningo, the port of the Adampee country. To the East of the settlement stand the remains of the former Danish Fort Friedensborg. It was one of the largest on the coast, and, deserted in 1842, is now somewhat ruinous.

Ningo Grande may be known by a ridge of hillocks to the eastward of it. The anchorage on the coast between these places is in general good, in from 9 to 6 fathoms, bottom of gravel and sand.

To the westward of the fort is the little river of Ningo, which descends from the inland mountains called the *Crobo Hills*, a high range about 12 miles inland. Of this range the summit is remarkable, being in the form of a great sugar-loaf, and called *Ningo Grande*, 1,431 ft. high.

From Ningo, eastward, the coast is low, being very little above the sea; and it thus extends nearly to the River Volta. Captain Burton says sheep could be procured here, in 1862, at from 3 to 6 dollars each. The people of Ningo speak a language different from that spoken to the westward; it is called *Adampé*, the name given to their country. The people of the Crobo Hills, though few in number, have hitherto baffled the Ashantis, by quitting their croom at the bottom of the mountain, the latter being of a great height, rugged, accessible but by one narrow path, and with springs of water on the top. From the summit they roll down upon their enemies the large stones and fragments of rock which abound there.

Beyond Ningo the coasts become still lower, being a sandy beach crowned with a line of bushes, the uniformity of which is here and there broken by some palms or dead trees. Before reaching *Occo*, 21 miles E. by S. from Ningo, this aridity becomes still more monotonous, and the beach becomes only a line of sand with blackish tufts. It is a narrow tongue separating the salt lake, which communicates with the Volta, from the sea. Outside it is a second line of breakers. Occo stands on this sandy beach, surrounded by palm trees.*

Addafoah or Little Adda (*Riverside*), about 1¾ mile westward of the entrance to the River Volta, is a native village with a few European merchants' houses, where the principal merchants reside; the village, being built in a hollow beyond the beach, is difficult to distinguish, but the mission house is conspicuous, and, being the first of the kind to the westward of the Volta, serves as a good landmark. There is fair anchorage off Addafoah, in 7 fathoms, sand. The mail steamers call occasionally to ship palm oil, but the treachery of the natives should be guarded against.

RIVER VOLTA.—At 30 miles E. by S. ½ S. from Ningo is the entrance of the River Volta, where the Gold Coast terminates. The land is so flat that it is difficult to know the place, especially in coming from the westward, for then the river is not seen till it bears N.N.W., when you descry the island which lies within its entrance. Tree Point, the South point of this island, brought to bear N.N.W., magnetic, leads into the river. In running along shore for the River Volta, you will soon know when you are abreast of it, as the water changes suddenly to a dark olive colour; regular soundings all the way, and the current setting strong round Cape St. Paul. About Cape St. Paul the land is very low, and you will not see it more than 12 miles off; it is covered with trees.

Rio Volta received that name from the Portuguese, on account of the velocity of its stream. It pours forth such a quantity of fresh water, that its quality is not altered at a great distance in the sea; and the colour, as well as the taste, differing from the common sea water, indicates with certainty the velocity of the river.

The River Volta is said to come from a long distance in the interior, and separating the great kingdoms of Ashanti and Dahomey, passes near the base of the Ningo Grande Peak, on the North side, 45 miles from the sea, at Asachare; from thence it takes a south-easterly direction towards the coast, and enters the sea between two low spits of sand. *Dolby Point*, the western spit, which is 1½ mile in length, overlaps *Richard's Point*, the eastern spit, but so as to leave an entrance of more than a third of a mile in breadth in a N.E. and S.W. direction. Within this entrance the lagoon opens out. *Adda Castle*, or Kongensteen, formerly a Danish fort, is on the western bank of the river, at 6 miles above the entrance, but is now in complete ruins. The country between is low. The town of Adda has about 8,000 inhabitants.

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* For the description of a trip along the shore from Accra to the River Volta, by Capt. R. F. Burton, see "Ocean Highways," February, 1874, p. 454 et seq.

Immediately North of Richard's Point a group of partially wooded islands, named *Kennedy Islands*, occupies the middle of the reach. On the eastern bank, about a mile North of the entrance points, there is a dark grove, which makes like a bluff headland; at 2 miles to the eastward of this grove there is another in the form of a conical hill, and on the western side of the river there are three other high groves, the trees in the immediate neighbourhood of Volta River attaining an unusual height.

The Bar sweeps round in a semi-circle before the outlet of the river, from Dolby Point to Sandy Island which adjoins the shore 1 mile S.E. of Richard's Point, but the surf on it is generally too heavy for boats to cross. Commander Glover, R.N., in 1868, crossed the bar in a small steam vessel, the least water being 12 ft., with deep water inside, but as a rule 9 ft. only can be carried over it.

The bar should only be attempted on the flood; and in order to bring the sea aft, it is recommended, when in 6 fathoms, 8 cables South from the centre of the bar, to steer North across the bar until Richard's Point comes on with the eastern part of the high trees on Kennedy Islands, bearing N.N.W., when a mid-channel course may be steered between the entrance points, and to a berth in 15 ft., North of the low spit of Dolby Point.

In June, 1881, the river entered the sea through two channels, one on each side of *Sandy Island*, on which stand two or three beacons. The western entrance admits vessels drawing 9 ft., but the bar is constantly shifting: the eastern entrance is useless, being encumbered with sandbanks.—*Lieut. R. M. Rumsey, R.N.*

The river is navigable for boats to Medica, a distance of 50 miles from the entrance; here the river is obstructed by rapids. Vessels drawing 5 ft. can reach Adda. Captain Croft saw, in 1873, canoes arriving and departing from Medina with palm oil. A very large and important trade has lately sprung up on this river.

It is high water, on full and change, at the entrance of the Volta, at $4^h 30^m$; springs rise 3 ft., but the range of the tide is affected by the height of the river level.

In December, 1872, Captain James A. Croft ascended the Volta, and obtained some palm oil. He says:—"The country generally is mountainous, and exceedingly fertile. At Akrapong the missionaries cultivate coffee. Cotton grows freely on the bank of the river in the Crepee country. The temperature I found to be a mean of about 87°, with a diurnal range of 25°—from 75° at night to 100° during two or three hours in the afternoon. The *climate*, proved by sad experience to be so fatal to Europeans in the immediate coast, I found o improve from point to point as I ascended the river. The habits of the people were peaceful and industrious."*

In 1875 M. Bonnat ascended the river to a great distance, travelling as far as the large city of Salaga. He subsequently ascended the river in his own boats, as far as *Yegiy*, about 22 miles from Salaga, and 30 miles from the mouth of the river, where he established a factory. He says that the Volta is as wide and as deep there as at Medica. There are many rapids and cataracts, but during the rains in September and October the river is said to rise 50 ft. at Medica, when steamers could then ascend without encountering any obstacle. —*Geographical Magazine, November* 1876, *page* 290.

Ataku, or *At-Akkoo*, 8 miles eastward of the Volta, was formerly a small fort belonging to the Danes, who claimed the intermediate territory between this and the Fort of Quitta, 30 miles to the eastward. On their establishments at these places being broken up, it fell into the hands of the natives, and subsequently was occupied by a Spaniard of the name of Mannea, as a depôt for slaves. The surf here is generally so bad as to make landing highly dangerous.

CAPE ST. PAUL.—From the Rio Volta the distance to Cape St. Paul (Wyee) is 17 miles E. ¾ S. The coast between is low and broken, and the point is covered with trees, as already noticed.

Remarks upon the Appearance of the Land from Cape Three Points to Cape St. Paul. By Captain R. Wauchope, R.N.

To the eastward of Fort Boutry the *Fort of Secondee* is seen. Its appearance from the sea is that of considerable strength; it stands close to the water, built upon a bank of horizontally-stratified sandstone, of a reddish colour, surrounded on all sides, except that of the sea, by thick wood. A narrow sandy beach stretches to the East and West of it. The bare rock again appears at the termination of the beach to the eastward, and is seen in several places within 8 or 10 miles from the fort, in this direction, and then a densely wooded coast.

The next fort is the Dutch Fort of St. Sebastian at *Chama* or *Assina*. This is a large white fort, surrounded by natives' huts, having a long narrow slip of white sandy beach to the West of it. The beach is broken to the eastward for about 3 miles, by the wood extending to the water's edge; when again a long narrow beach continues for 8 or 10 miles, and the red cliff is seen, bare of vegetation in several places. The land is not high, but entirely covered with low wood.

The next fort is the *Fort of Commenda*, or rather the two forts. They may be seen at the same time with Chama. One of the forts, of a dark grey stone, a square building, seemed to be in tolerable repair; the other, about a mile to the eastward, was a complete ruin. A number of native huts were seen near the forts, and a great number of canoes were hauled up on the beach.

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* For full particulars of this interesting journey, see the Proceedings of the Royal Geographical Society, No. II, 1874.

From thence to the eastward, the two large and magnificent-looking forts (Dutch) of *St. George del Mina*, or Elmina, make their appearance, as if newly whitewashed, and are of a dazzling white. On approaching them we observed, about half a mile apart, two other small forts; the one to the westward being round, and the other square. The western large fort is situated upon a rising rocky ground, about 70 ft. above the level of the sea. The eastern large fort stands on the beach, in the middle of a considerable-sized village. Some of the houses are of stone, but it chiefly consists of miserable-looking huts. To the eastward of Elmina, the same low, undulating, wooded line of coast stretched along, with a narrow strip of sandy beach.

Soon after Elmina is clearly made out, the round Fort William, of Cape Coast Castle, is seen rising magnificently from the sea; it is built upon rising ground to the rear of the castle, and is the first object which is seen. On approaching, the handsome and extensive castle of Cape Coast is clearly seen; and, on landing, the interior does not disappoint expectation, as the whole of the buildings are in admirable repair. A few miles to the eastward of Cape Coast Castle the ruined English fort of *Moree* is seen. The mud huts of the natives still surround the square brown ruin. Still farther to the eastward the small Fort of Anamaboe is seen. The appearance of the coast is similar to what we have already passed, viz., a narrow sandy beach, rocky in some places, and low undulating hills, covered with low underwood, behind.

A few miles to the eastward is the ruined, square, and brown fort of Cormantine, situated on a pretty rocky green hill, close to the sea. The natives' huts extend to the westward of the fort, and to the eastward the same description of coast as that above mentioned. At 17 miles eastward of Cormantine, *Tantumquerry Point* is seen; it is low and rocky. There is a reef of rocks lying about a mile to the N.E., on which the sea was breaking when we passed it. On first seeing the point, one fort only is observed; on approaching, another square brown fort, nearly joining the former, is seen; and the low land becomes visible beyond the *Devil's Hill*, which is the highest hill on the coast between Cape Three Points and Accra.

When abreast of Tantumquerry Point, the *Fort of Apam* is seen to the left of Devil's Hill; a brown ruin of considerable size. A large native village surrounds it, except to seaward. Along this whole line of coast (for we have run it down within from 4 to 6 miles) there are native villages to be seen at intervals, consisting of thatched mud huts. The next fort is that of *Winnebah*, now in ruins. When abreast of this you can just see Tantumquerry Point, and the fort to the westward, and *Barracoe Point* to the eastward. Winnebah stands upon a low line of hills, having nothing particular to mark it, except a whitewashed thatched house of considerable size on the beach, and the ruins of a fort a little to the left. There is high land in the distance.

The next point is Barracoe Point, with a very remarkable palm tree upon it; and to the eastward of it, considerably higher than the low land, the peculiarly-shaped double hill, called the Paps, is seen in the distance. This and the palm tree point out its situation very distinctly. On nearing the point, the fort and flagstaff, and native village are seen, and the distant coast beyond, terminating in a very low point.

On rounding Barracoe Point, the Paps are much more distinctly seen, being much nearer; and the remarkable hill called the *Cook's Loaf*, a conspicuous round hill, is close to the sea.

Accra.—The land to the West of the Cook's Loaf appears very low, and to run out to a very low point, having still the very narrow strip of sandy beach; and on the point the three white forts of Accra are seen; and a fourth, the Danish, 3 miles to the eastward. The English and Dutch are within a mile of each other; so that the coast about Accra is particularly well marked.

We sailed from this on the 17th November, and on the 18th hauled in for the land, and found ourselves in the morning abreast of Ningo, a Danish fort. It is a good-looking whitewashed fort, apparently in good repair. About 7 miles off shore, the water shoalens to 7 and 6 fathoms; a little further out, 12, 13, and 14 fathoms; and all the land seen to the eastward appears very low indeed.

The marks for Ningo in the Sailing Directory are some hillocks to the eastward, and the high conical mountain of Ningo Grande inland; the hillocks I could not make out clearly. When abreast of Ningo, a small fort is seen to the westward, which is, I suppose, the fort of Pram Pram. There is the same narrow line of sandy beach, as we have observed all along, to the eastward of Pram Pram still. Another white house or fort may be seen when abreast of Ningo. To the eastward, the tops of trees only are to be seen, the land being so low. Six and seven miles from the shore, the soundings along the coast are 11 to 13 and 14 fathoms, coarse sand, and in some places rocky bottom.

A great quantity of seaweed was seen to the eastward of Ningo; the first we met with on the coast. Abeam of us, about 1 p.m., some miles to the eastward of Ningo, observed a flagstaff, and two large thatched houses; a number of naked negroes; and on the beach was a great deal of surf. The wood on the coast here consists chiefly of a peculiar kind of palm, the stem similar to the cocoa-nut tree, but the upper part more bushy, and similar in appearance to the silver tree at the Cape of Good Hope.

At 3 p.m., November 18th, saw the mouth of the River Volta, bearing N.N.W. It is on this bearing alone upon which it can be seen. The two bluff heads at the entrance appear very bold, and make the mouth of the river very obvious. In standing along to the eastward, the entrance was not seen above five minutes, as it was soon shut in by the eastern bluff.

The whole coast to the eastward of the Volta, to Cape St. Paul, is very low; nothing but trees are seen. In 9¼ fathoms off the cape this is its appearance; nor could the cape itself be made out, except from the trending away of the land to the northward.

V.—THE BIGHT OF BENIN, FROM CAPE ST. PAUL TO TERRA FORMOSA.

The western point of the bight, Cape St. Paul, has been before noticed; its eastern extremity has been called *Cape Formosa*. In both cases the appellative *Cape* has been most improperly applied; for these extremities, as well as the intermediate coast, are very low. It has, moreover, been determined by survey, that on the eastern side there is not even a projecting point to which the characteristic of *Point* can apply. This is the reason why different spots of land have been from time to time assumed as the *Cape*, and misrepresented accordingly.

The whole of the coast, between the Rivers Benin and Old Calabar, is very low, and almost uniformly level land; the only visible inequalities being caused by the growth of the trees, which in many places spring up out of a swamp; the land being overflowed at high water, in some parts, for miles. Near the sea coast are numerous creeks, navigable by large canoes, and forming a communication between the above rivers, and it is said, even as far as Lagos and Whydah.

We make the following extracts from a paper read by A. Swanzy, Esq., before the Society of Arts, April 17th, 1874:—"Eastward of the British settlements we have, or had, factories at Quittah, Porto Seguro, Aghwey, Little Popo, Grand Popo, and Whydah, each of these places being politically independent of the others. Quittah formerly belonged to Denmark, and was ceded to the British in 1850; but it has not since been occupied by an English officer, and we have paid a small export duty to the native chiefs for protection. The great drawback to trade at all these places, except Whydah, is the inveterate dishonesty of the natives.

"In the event of shipwreck on the slave coast, the stranded vessel is plundered of everything moveable, as in the instance of the *Bentinck*, lost at Grand Popo, on the 24th May, 1872. She had goods on board of the value of £13,000; the whole were landed and taken away in broad daylight by the natives.

"The resources of Dahomey are very great; the country is covered with the oil-palm, and if the slave labour, formerly exported, but even now very considerable, were employed in developing these resources, the Dahomans might become the greatest commercial nation in West Africa. But a great change in the government of the country must be effected before such a desirable result can be attained. As long as the persons and property of all Dahomans are at the mercy of the ruler, it is not politic, it is not even safe, to acquire wealth, and thus attract the covetous desires of the king."

CAPE ST. PAUL, as before stated, is not to be distinguished, except by the changes in the direction of the coast, which gradually trends round to N.N.E. On the South end of this low land, about 6 miles eastward of Atakoo, are two palm trees. All this part of the coast is merely a sandy beach of varying breadth, between the sea and the extensive line of lagoons which serve as a means of intercommunication between the towns on the coast. *Wyee*, or *Awey*, once a slave factory, is on the eastern part of the projection, at 3½ miles E.N.E. from the two palms; and at 2 miles north-eastward of this is *Tebwy*, where is a conspicuous clump of trees. Wyee may be recognised by a cluster of trees, huts, and a flagstaff, and plenty of stock may be obtained here. Vessels can anchor off this village in any convenient depth.

JELLA COFFEE, or Jellu Kofi, 1 mile northward of Tebwy, was an insignificant place till it was made a calling station for the African Mail Company's steamers. Its importance has increased from this. There is little in the spot itself to distinguish it, the land being covered with low trees and brushwood. Provisions and live stock of all kinds are abundant at Jella Coffee, and from the merchants' factories it is probable that many supplies could be obtained.

When made from the eastward, Jella Coffee appears as several islands, the western of them being a clump of trees among which the huts and houses are built. When approached from the westward, the first white house seen, after rounding Cape St. Paul, will indicate the place off which to anchor. A large vessel might anchor in 6¾ fathoms, sand, with Quitta Fort bearing N. ½ E., and Jella Coffee flagstaff bearing W.N.W. *At night* care should be taken not to mistake the lights in two or three houses a mile northward of Jella Coffee for those of the village.

QUITTA.—The town and former Danish fort of *Quitta*, 2½ miles N.N.E. of Jella Coffee, may be known by its white fort and factories, and clumps of trees. The land between is low and marshy, almost even with the surface of the sea. At 2 miles southward of the fort are two white houses, and a flagstaff, the station of the naval contractor. The fort is included in an independent State of Kerrapay, called *Agwoona*, which extends thence along the coast to the Volta. There are six towns* between, the principal of which is Agwoona, and the caboceer of this place is supreme over the others, but not absolute.

Plenty of stock, &c., can be obtained at Quitta; and there is good anchorage in 7 fathoms, fine sand, half a mile from shore, or in 10 fathoms, with the fort bearing N.W. distant 2 miles.

Between Quitta and Popo are four Kerrapay towns, governed by caboceers, independent of each other, as well as of Agwoona. From Quitta to *Acquijah*, the distance to the N.E. is nearly 3 miles; and from thence it is 5½ miles to Elmina Chica, where there is a white factory. At 5 and 8 miles respectively eastward of Elmina Chica are the villages of *Adaffi* and *Flohow* or *Porourah*, with some white houses. The coast is low, flat, and wooded all the way. For 18 miles East of Flohow the coast is a range of bushy sandhills, with tall trees at intervals. *Gomalouta* or *Porto Seguro*, 21 miles eastward of Flohow, has a white factory, and a red-roofed building with a flagstaff. Sheep, &c., may be obtained at these villages.

Before reaching Little Popo, 3½ miles eastward of Porto Seguro, the coast loses its aridity and becomes green and wooded at the village of *Fish Town*, but, after passing this, it again becomes the barren sand, bare of vegetation, except a few stunted trees; and before seeing Little Popo it becomes entirely bare of vegetation. The mass of blackish houses at the latter place, therefore, are very plainly to be seen; a few palm trees only are to be seen near it.

POPO.—From Quitta to Little Popo, 40 miles E. ¾ N., the coast, rounding regularly, forms a bight, in which from 12 to 15 fathoms may be found at 5 miles from the shore.

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* "The Spanish and Portuguese names of the places on this coast, are the remnants of the former extensive slave trade carried on by these nations, and are often confounded with the native names. Thus the names of Padiena, Mina Chica, Cogmoa, Port Seguro, are confused with those of Dumfiou, Paurey, Guigliou, and merely designate half a dozen unimportant villages lying between Quitta and the large village of Little Popoe."—*M. le Compte Bouet-Willaumes.*

Little Popo was one of the most extensive slave factories on the coast; it is close to the water side, and has a very bad beach to land on. The Dutch once had a factory here, but no sort of fortification. A little river, the mouth of which is choked up with mud, runs by the town, within the beach; but fresh water is not to be got off without great difficulty. You may anchor, with the town bearing North, in 8 or 9 fathoms, sand.

Little Popo presents an imposing front of white beach storehouses and signal poles, which display the British ensign at three positions, and one of which marks the residence of the native chief, from whom canoes may be hired and stock purchased. There is a missionary station here, as also at Aghwey, Great Popo, and Whydah. The mail packets call here.

A lagoon, navigable for canoes, extends parallel with the whole of the coast of Benin. It is separated from the sea by a tongue of sandy land of very variable breadth, and consisting sometimes of pure sand. At Little Popo this sandy neck is not more than 2 cables' lengths wide; the native village is built on it; and the European factories are erected on the opposite side of the lagoon. Their white walls are not visible till the meridian of the village is passed, and then they appear as if connected with the native houses. The bar of the beach is more accessible at Little Popo than elsewhere, by means of the country canoes.

Aghwey.—At 4 miles E. ¾ S. of Little Popo is another group of storehouses, where our flag is displayed, and an agent of Messrs. Hutton superintends the collection of palm oil and ivory, as well as the introduction of our manufactured goods. The place is called Aghwey, and, like Little Popo, was classed as a slave station. Two branchless, withered trees, lie a little to the eastward of the town. H.M.S. *Danae* anchored in 10¼ fathoms, 2 miles off Aghwey, with Little Popo bearing N.W. ¼ W., and Aghwey N.N.E. There are two conspicuous factories at *Bae*, 8½ miles E. ¾ S. of Aghwey.

Great Popo.—Between Little Popo and Great Popo, 14 miles to the eastward, the coast is low and swampy, dotted here and there with trees. The town of Great Popo lies at the back of the sand ridge (which is occasionally broken through by the lagoon at Great Popo), and cannot be seen from the offing. It was formerly used as a slave station. The position of this place may be known by the white houses which lie along the beach, and a remarkable clump of trees 4 miles to the eastward.

WHYDAH.—The Hu-ta, or Sea-beach of the "Liverpool of Dahomey," 12½ miles E. ½ S. of Great Popo, is a sand-bank, rising some 20 ft. above the sea-level, and bright with the usual salsolaceous plants. There are no dwelling-houses, nor do the white merchants of the upper town often sleep here. Several establishments of mat roofs and mud walls (the French being incomparably the best) serve for the storing of cargo, and for the transaction of business during the day. The mail steamers call here. There are usually three to four ships rolling in the roads, and the more sanguine declare that the great slave port might, if she please, export 10,000 tons of palm oil (£340,000) per annum.* There is anchorage in 7 fathoms, sand, 1 mile off shore, with the highest storehouse bearing North.

Whydah itself is from 2½ to 3 miles distant from the beach; the road to it is across the West lagoon, 300 yards broad, and salt only when the sea flows into it at high water. Fish and oysters are excellent, and supplies of live stock, &c., may be obtained. A detestable road over swamp sand brings you to the town of Whydah, which is about 2 miles long by half a mile broad, and has been said to contain 30,000 people, but probably has about 12,000. It has four European forts—French, Brasilian, English, and Portuguese, in the order of seniority. "Factory" or school would be a better term for them than fort. The place is graphically described by Capt. Burton in his work quoted on the previous page.

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* Capt. R. F. Burton's Mission to the King of Dahomé, 1864, vol. i., p. 32.

The dollar is the nominal currency hereabout, but cowries are in more direct use. The ounce and ackie system still prevails, as well, and requires nearly the same assortment of goods as to windward; but the trade is transacted on shore.*

"Heavy port charges are levied on every ship anchoring and landing goods at Whydah; they amount to about £45 on each two-masted vessel, a three-masted vessel paying much more, consequently a barque of 250 tons would pay more than a brig of 300 tons; but these charges are in lieu of duties on goods. This system prevents anything like a small trade being transacted from a trading vessel, as the percentage would be too heavy."—*A. Swanzy, Esq.*

AGBOME, or *Abomey*, the capital of Dahomey, is about 62 miles, marching distance, from the roads of Whydah, and 1,065 ft. above the sea, Its barbarous monarch reigned supreme over the surrounding region, and his annual "custom" was represented to the world as being accompanied with most barbarous slaughter of human victims; the number of which it is likely were greatly exaggerated. It was the object of Captain Burton's mission to King Gelele, in December, 1863, to endeavour to put a stop to the sacrifice of human life, and also to the slave trade. His well-known work before alluded to, gives by far the best description of the region and its inhabitants.

At 7 miles westward of Whydah Road lies, on the flat shore, a remarkable hillock, called *Mount Pulloy* or *Palaver;* and 3 miles westward from it you perceive three or four groves of trees, the westernmost of which is the largest. In the middle of these groves stands one tree, of a prodigious height, appearing at a distance like a tower. There stand also, about 3 miles westward of Whydah, close to the sea side, two trees, with great round tops, which are called the *Two Brothers.* These trees serve as a good leading mark for the town, off which there is a convenient roadstead in 8 and 7 fathoms, muddy bottom, 2½ miles from shore, with the town N. by E. and the Brothers N.N.E. No ship's boat can land here.

To the eastward from hence stands a thin wood, which extends along shore to a great distance. After leaving Whydah you must, to make out the points connected with the villages, keep very close in-shore. Some of these villages are very considerable, and are more or less embosomed in trees.

The country surrounding Whydah is fertile, open, and level, exhibiting large savannas covered with high grass, although in some parts thickly wooded with fine grown trees. To the North of the town are some well cultivated lands, producing peas, calavancies, maize, and yams.

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* See Lieut. Bold, page 61, and Adams, page 106. Little gold is seen to the eastward of Accra, as the country does not produce it, and the use of it is almost unknown to the natives of Whydah, Ardrah, Lagos, and Benin.—*Adams.*

In running along the coast to the eastward from Popo, in 8 fathoms, the town may be seen from the deck, by means of a good telescope, at about 3 miles from the beach, there being scarcely any wood to intercept the view; and thus you can easily gain the anchorage of Whydah.* From Whydah the coast trends E. by S. ¼ S., 78 miles, to *Lagos*.

At 10 miles E. by S. of Whydah is *Godomay* or *Jackin*, formerly a slave station, where no huts or canoes can be seen, but the place is marked by a conspicuous tree, and a solitary white house. A palm oil vessel may sometimes be seen loading off Jackin. *Cutanu*, or *Appi*, lies 10 miles beyond Jackin, on a narrow strip of land between the extensive Ahuanga Lagoon and the sea. This place may be known by a cutting made through the jungle on shore which opens on the bearing N. by E. ½ E. At Appi three or four vessels are generally loading palm oil. There are three factories here.

PORTO NOVO.†—At 9 miles eastward from Appi is Porto Novo, and between these places two small villages may be seen. You may anchor at 2 miles S. by W. of the hut in 7 or 8 fathoms, black clay, with shells, or sand. The town of Porto Novo is situated at the eastern part of Porto Novo Lagoon, 10 miles E.N.E. from the landing-place on the sea coast, and 50 miles to the westward of Lagos.

A single hut at the high water-mark, and a grove of table-topped trees, which appears through an opening in the foreground, and lies a mile inland, are the only marks for this place, which was notorious for shipping slaves, and for constantly having suspicious craft, under various colours, at anchor.

BADAGRY.—At about 18 miles E. by S. from Porto Novo is the roadstead of *Badagry*. The town of this name, containing about 15,000 inhabitants, is 1 mile from the beach, and situated on the North bank of the lake or river that runs parallel with the coast to Lagos, and is at Badagry about 200 yards broad. A shrubbery intercepts the view of the town, until the river is very nearly approached. The anchorage in the road is pretty good, in 8 fathoms, mud and shells, with the white cottage bearing N. by E. about a mile distant.[*] The landing-place is rendered conspicuous by a couple of barrel posts, a store shed, a flagstaff, a whitewashed cottage, and an iron house. *Mount Badagry*, a clump of bushy trees to eastward, is also conspicuous. There is a white trading agent at Badagry, and stock and refreshments may be obtained.

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* About 15 miles West of Whydah is a fort named *Appi Vista*. For the whole right and liberty to trade in palm oil in this place—I have been informed, on good authority—one of the oldest and most celebrated slave dealing residents there, gave the the King of Dahomey something near 10,000 dollars a year. That such a sum should be paid for this exclusive privilege shows the importance of the locality; and the iniquity of the monopoly is further proved by the fact that the king binds all his traders to give palm oil to this man, and to him alone, at the price fixed on by his majesty.—*Hutchinson.*

† This place, with Whydah, were the slave-exporting places of Dahomey, the king of that place having obtained great influence over the chief of Porto Novo. This influence, backed by the representatives of some Brasilian traders, led to much interference with British interests, contrary to treaty, the privilege of trading and erecting factories being denied to them. This rose to such a pitch in 1860-1, that Consul H. G. Foote determined to attack the place. H.M.S. *Brune*, with seventeen men, under Commodore Wrati-land, with two other vessels, steamed up Badagry Creek, February 21st, 1861, and reaching Porto Novo, they were sharply attacked on the 25th, but the threatened punishment was not then inflicted.

In consequence of a continuance of aggressions, on April 26th, the place was attacked and burned, and it is supposed 500 out of the 10,000 defenders were killed, the British loss being only one killed, and five or six wounded. This deserved retribution had a good effect.

The *inland water communication*, which extends from Porto Novo, and also with the Whydah Lagoon, still farther West, was examined by Capt. Glover, R.N., in 1858—62, and his sketch survey first showed its very peculiar features. It is generally very narrow, only from one-eighth to one-quarter of a mile in breadth, with depths varying from 20 to 10 ft., and in some parts with only 6 ft. depth. All the villages and towns are situated on the *North* side of this lagoon or river.

LAGOS.—From *Badagry* to the mouth of the *River Lagos*, a distance of 33 miles E. by S. ½ S., the whole coast is low, marshy, and very unhealthy. At 9 miles distant is *Suzu*, formerly a slave station, which may be known by a few huts; and there are a few other small villages covered by palm trees. It is bordered all along with palm trees, and the landing is rendered dangerous by the high surf; besides it is much subject to heavy rains and tornadoes. These may be foreseen by the great thunder and lightning, with the rising of black clouds, which commonly precede them. Then it is best to hand all your sails, except your foresail, which you may keep in the brails, to command your ship, and run before the wind during the tornado, for what you get is to windward.

The town of Lagos (*Eko*), about 3 miles North of the bar, is large, contains about 5,000 inhabitants, and carries on an extensive commerce, both in the interior and on the coast. The island on which it stands is very low, being a few feet only above the level of the lake at high water; it swarms with water rats. The necessaries of life are here extremely abundant and cheap. At the settlement on the western side of Lagos Island there are numerous factories and several wharves, affording facilities for loading and unloading cargo. There are two colonial, and four merchant steam vessels that ply over the bar.

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[*] Richard Lander, in the Journal of his Expedition to explore the course of the Niger, has given a pleasant account of his sojourn at Badagry, where he landed in 1830. On the 22nd of March he debarked from on board the *Clinker*, and having been taken into a canoe, at the edge of the breakers, it plied over a tremendous surf, and was flung with violence on the burning sands. He was then conveyed by a native canoe through an extremely narrow channel, overhung with luxuriant vegetation, into the Badagry River, which he describes as a beautiful body of water, resembling a lake in miniature; its surface being smooth and transparent as glass, and its picturesque banks shaded by trees of a lively verdure. Landed on the opposite side, where the road lay over a magnificent plain, on which deer, antelopes, and buffaloes were seen. On proceeding, various groups of people were passed, who were seated under the spreading branches of superb trees, vending provisions and country cloth. The town was exceedingly populous, and people were found vending a variety of articles at every step of the way.

The natives procure the necessaries of life chiefly by fishing, and the cultivation of the yam and Indian corn. Oranges, limes, cocoa-nuts, plantains, and bananas, are produced in abundance in the neighbourhood.

[illegible]

[illegible]

[illegible]

[illegible] are very small, but are so frequented, and under favourable circumstances, [illegible] The [illegible] English, three French, and two German houses have trading establishments, and a large number of [illegible] traders from Sierra Leone, [illegible] in the aggregate a greater demand for produce than the supply can profitably meet. The approximate yearly export is [illegible] tons of palm oil, [illegible] tons of palm kernels, [illegible] and small quantities of gum, wax, and miscellaneous produce. The palm oil, though fair in quality, [illegible] —[illegible], Esq., [illegible]

The well water is very good, the best being obtained on the mainland opposite the town. The average cost of coal is [illegible] per ton, and can be obtained by flats that carry about 4 tons. In 1880 the demonetization of foreign silver coin was decreed, which is now replaced by British silver.

The RIVER LAGOS and its surroundings were first surveyed by Lieut. Glover, in 1859. He says that the entrance is subject to continual changes, particularly during the rainy season.

The bar is not always practicable, as the *rollers* frequently break and extend to the beach, covering the whole with foam. From May to September the passage is intricate and curving, but for the remainder of the year it is generally straight. At all times there is a break across the bar, worst during the rainy season, when sometimes steam vessels cannot cross. No vessel ought to draw more than 7 ft. to be of use in carrying cargo over. Less draught would be an advantage, as the bar is very treacherous in its shifting; sometimes it will, in 24 hours, have shifted the channel 40 or 50 yards. The depth is also variable, altering as much as a foot in two or three days. During the year the depth varies from 5 to 9 ft. at low water. Ships drawing 12 ft. have been towed over the bar, but 9 ft. may be considered the maximum draught. No vessel should attempt to cross without a local pilot, as the chart cannot be of any use, and nothing but constant practice can insure safety, although the channel is buoyed, and leading beacons are placed on shore.

Light.—A *fixed bright* light, elevated 60 ft., and visible about 8 miles, is shown from an iron tripod, 65 ft. high, and painted white, on the eastern point of the lagoon entrance.

The Town is situated about 2½ miles within the entrance on the East side at the commencement of Lagos Lagoon. Along its S.W. face are the various European factories, in the middle of which is the English church, in lat. 6° 28′ 21″ N., long. 3° 25′ 50″ E.

"The town is kept cleaner than formerly, and in this respect improvement is going on steadily. The houses are far superior to what they were formerly, the living is better, and although the climate is depressing and trying, and cannot be termed healthy, yet the Lagos of to-day is as different and superior in every way to the same place when ceded in 1861 as it is possible to conceive; whilst as regards appearance it is undoubtedly the finest town on the Gold Coast; and with its European-looking houses, its fine Marina, and the river alive with steamers and sailing vessels, it presents to the stranger the idea of what it is—an active, stirring, business centre."—*Lieut.-Governor Griffith*, 1881.

Anchorage may be had abreast of the town in 12 to 20 ft. The breadth of the channel from point to point is half a mile, and through it the lagoon pours out, about half ebb, such a volume of surface scum, of a deep brown tint, and of a sickening odour, as to spread over a sweep of 3 miles from the coast, the edge of which is marked by a well-defined margin as it rolls forward on the deep blue water of the offing.

Merchant ships anchor in 7½ fathoms with the entrance of the river open. Men-of-war anchor in 10 fathoms, with Beach House and the Government flagstaff in line; or a good berth is in 6 fathoms, 1½ mile off shore, with the East entrance point bearing N. by W.; here a ship will be out of the stream of the river, and ride head on to the heavy swell that always rolls into Lagos Roads, and renders it such an uncomfortable, if not dangerous, anchorage. The prevailing diseases are remittent fever and dysentery.

It is high water, on full and change, at Lagos, at 6^h; springs rise 3 feet. The ebb tide makes down beneath the surface for about 3 hours, whilst the stream is running strong into the river. The flood makes up in the same manner to within 1½ hour of high water, before it becomes perceptible on the surface; then it runs with great rapidity, so that a boat can scarcely pull against it.

"*The current* round the coast in the vicinity of Lagos follows the outlines of that coast and sets to the eastward, but it is exceedingly variable in its strength. I have found it run at the rate of 70 miles in 24 hours, and I have found again some days scarcely any perceptible current. While at anchor in Lagos Roads, from careful observation I found its average rate to be about 1½ knot per hour; but two or three days in the month of October I found its motion retrograde to the westward; ships, therefore, should be careful and not over-run the port by trusting to the uniformity of the current's rate. The best mark for making Lagos is the shipping at anchor in the roads, of which there are generally from ten to twenty sail. There is such a sameness all along the coast that no distinctive mark could be given to go by. Much has indeed been said about the big tree of Lagos, and there is certainly a large tree a little East of the river entrance, but it cannot be seen except from the anchorage. On nearing the anchorage, the breakers on the sand-banks which form the bar of the river entrance will become visible, extending some distance from the usual coast line; also the signal-staff from which the bar signals are displayed, and on the arrival of a vessel the union jack is hoisted upon it.*

"*Pilotage* 10*s*. a foot. Towage is high, and the tariff varies; I have seen £20 given, and also £35 for towage over the bar—the former sum when all the steamboats were there, and there was competition—and the latter when the majority were gone trading up the Niger, leaving one behind, and there was a monopoly; vessels have frequently to wait a long time for towage. I myself, in the *Pelham*, waited 35 days before it came to my turn to be towed, and even then, beside paying £35 beforehand, I had to beg most earnestly for the privilege of being towed in. Once over the bar, there are no dangers in the river, for there is from 3 to 4 fathoms in the fairway channel. Most of the firms there have wharves at which vessels consigned to them lie free of charge.

"The great drawback to Lagos is its bar. Seldom or never does a vessel cross it without striking heavily several times, and many have been totally lost on it. Moreover, vessels cannot load full inside the bar, and the lighterage is most expensive, from 8*s*. to 12*s*. 6*d*. per ton.—*Extract from a Letter to the "Mercantile Magazine," May*, 1870.

The Ikoradu Lagoon, corrupted to "*Cradoo*" Lake, is a broad expanse of the interior waters to the north-eastward of Lagos. From that town it stretches for 9 miles to the town of *Ikoradu*, a place of considerable trade, near the mouth of the *River Ogun*, which runs to Abbeokuta, 34 miles nearly due North from its mouth. From Lagos it extends with varying breadth for 35 miles to the town of *Epé*, or *Ekpé*.

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* SIGNALS.—The following bar signals (Commercial Code) are shown from a flagstaff on the East entrance point:—For bar boats, when the bar is smooth, flag S; when rough, flag B. At 3 hours before high water, the 3rd pendant; at 2 hours before, the 2nd pendant; at 1 hour before, the 1st pendant; and at high water the pendant will be hauled down, and flag S or B hoisted.

Abbeokuta is a place of considerable reputation. It first excited attention from the visit of the Rev. T. Freeman, in 1842, who found there a number of liberated Akoo slaves, who had emigrated from Sierra Leone, and located themselves in these districts, preferring to remain under the protection of its King rather than reside in the more dangerous and insecure town of Yorruba. The significant title of *Understone* has been bestowed on it by the natives, from the circumstance of its situation amid vast fragments of white granite, which also lie scattered around its outskirts in isolated masses.

It was visited by Captain R. F. Burton, H.B.M. consul, in company with Captain Bedingfield, R.N., in October and November, 1861, who came to the King on a mission, with the object of putting a stop to the slave trade, and the offering of human sacrifices at religious festivals, as had been assented to by the treaties of 1851. The King accorded the new treaty, but broke it immediately afterwards.

The *Country of the Jaboos*, to the northward of the lake, is inhabited by a fine-looking people, " who seem as if they always came from a land of plenty; being stout, healthy, and full of vigour." They are very industrious, and manufacture for sale an immense quantity of Guinea cloths; besides raising cattle, sheep, poultry, corn, and calavancies, with which they supply their neighbours.

M. de Boüet-Willaumez says:—The lake is separated from the sea by a low marshy island, which extends from the mouth of the Lagos to that of the Formosa or Benin. Several marshy inlets, with but very little depth, intersect this extensive island, connecting the lake with the sea. The island is called, on the old charts, *Curamo*, but by the natives *Ikbekou*. In the lake at the West end of the island are three islands, opposite the Lagos entrance, on one of which is the town of Lagos, or Eko (or Ichoo).

From Lagos entrance the shore extends about 63 miles to the eastward, with very slight inflections, and a sandy strand all along. Within land, about 3 miles from the shore, and almost parallel to it, runs the river or creek, which, from Benin River, enters Ikoradu Lake. It is bordered with trees for about 54 miles, or as far as the East end of Ikoradu Lake; then it appears naked, the trees standing farther inland, and along the creek. These are remarkable by being red-topped; and they go no farther than the sandy strand, at the end of which is, or was, a tall, spreading, solitary tree. There you may anchor, at 3 miles from shore, in 4½, 5, or 6 fathoms, muddy bottom.

Along this coast, amidst the groups of trees which stand on the shores, are numerous villages, of which *Quoin*, *Jacknah*, *Palma*, *Jaboo* (where are three remarkable vistas through the island of Curamo), and *Odi*, are the principal; the latter is larger than the others, and points out the limit of the Lagos colony. Here is met with the first indication of the efflux of the great River Niger. The soundings from the West up to this point are sand; beyond it, to the southward, mud, and muddy shallows, of 3 or 4 fathoms, project 2 or 2½ miles from shore.

All this coast, inhospitable and very little frequented, is, for the most part, drowned occasionally by the sea, or by the heavy rains in August and September.*

The regularity in the bank of soundings, at 30 miles East of Lagos and South of Palma village, is interrupted by a remarkable submarine feature known as *Avons Deep*, in which the depth of water suddenly increases at the outer part from 70 fathoms to more than 200 fathoms, and at the inner part from 40 fathoms to more than 200 fathoms.

The centre of this remarkable submarine valley is situated in lat. 6° 10′ N., long. 4° 0′ E., at which position the 100-fathoms margins of the bank of soundings are 8 miles apart, and from whence the deep water trends about North for 10 miles, the 100-fathoms edge of soundings on either side gradually approaching each other.

The northern part of Avons Deep is about 7 miles from the shore, bearing S.S.W. from the village of Palma.

There is no overfall, nor anything on the surface to indicate the existence of this singular conformation at the bottom; nor is there any opening in the adjacent coast, or any apparent change in its character. The prudent navigator, however, should be upon his guard when in its neighbourhood, for if approaching the shore at nightfall, or in hazy weather, in dependence on the lead, and intending to be close in at daylight, he might be fatally deceived by a cast with no bottom in this deep, imagining his vessel outside the bank, instead of within 6 or 7 miles of the beach. In some cases, however, this deep, like the Bottomless Pit, may be of material service to the seaman at night, by giving him a fresh departure.

BENIN or BINI RIVER, or Rio Formosa, shows like a green, low, bushy strand, in front of a thick row of trees, of regular height, and with a few insulated huts or houses. The shore is sandy, and the depths 4½ and 5 fathoms at 6 miles off the mouth of the river.

Benin River is 1¾ mile wide at its entrance from the sea, and has across it a dangerous bar of mud, clay, and sand, extending out 4 miles to seaward, and on which there is only a depth of 9 ft. at low water. Vessels not drawing more than 7 or 8 ft. may generally pass it in safety, by taking the proper time of tide, but merchant vessels usually remain in the outer road. At a few miles from the sea this river is only half a mile wide; and at New Town, or Young

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* The following note may, perhaps, not appear improper in this place:—

From Sherbro to Rio Formosa, or River Benin (which is the part of Africa with which Europeans are best acquainted), a tract of 1,400 miles of sea coast, there is not one navigable river, bay, or harbour, into which a ship can enter; nor is there one river or creek (the Volta and Lagos excepted) into which a sailing boat can advance 10 miles from the sea; very few of the creeks will even admit a boat; and not one on the Gold Coast, except at Chama and Elmina; a small boat may row up the former about 2 miles, and up the latter about a quarter of a mile.

The shores are, almost in every part, difficult of access, from the heavy surf which breaks upon the beach; it is scarcely possible to land anywhere but in a light canoe, and even in that way it is frequently impracticable for many days together; in many parts, besides, there is, near the shore, scarcely water enough for a canoe; and the breaking of the waves becomes there so impetuous, that all communication between the shore and the shipping is frequently interrupted for three weeks together, and can seldom be effected with safety.—*Dalzel.*

Town, which is 22 miles up, little more than 400 or 500 yards. Two branches near New Town, called *Gato Creek* and *Warree Creek*, are nearly equal in magnitude to the main trunk; one, running to the N.E., communicates with Gato; and the other with the River Warree or Forçados and other rivers forming a portion of the delta of the Niger, and continues up to the Niger, from which it diverges a little below Eboe. The direction of the main trunk is about E.N.E.; and, according to the report of the natives, at about 50 miles up, it is not navigable for vessels of 50 tons. The depth of water in any part rarely exceeds 4 fathoms.

The leading mark across the bar of this river is Harrison House, easily recognized, being a conspicuous white house on the western shore (the western and largest of four), just open of the North entrance point bearing N.E. ¾ E.; this mark will lead over in 12 ft. at high water neap tides. When about 1 mile from North Point, gradually haul to the eastward, rounding it at the distance of about half a mile, and when it bears N.W., steer along the western shore, keeping from 3 to 5 cables from the bank. Off Harrison House there is good holding ground in 7 fathoms about 3 cables from the shore. Horsfall House, built, like Harrison House, of galvanized iron and whitewashed all over, stands on the opposite side of the river, on a small sand island near Battery Point.

The *best anchorage* for vessels without the *bar* is 3 miles from it, and 5¼ miles off the river's mouth, in 4¼ fathoms; the river well open, and the N.W. head bearing N.E. ¾ E. Here the bottom is of heavy mud and clay.

On the eastern side of the entrance may be seen an assemblage of huts, called *Salt Town*, which is 3¼ miles from the N.W. head. The bar between stretches out to seaward, as already noticed. On the N.W. side of the entrance, a sandy spot extends from shore to the S.W., a part of which is dry at low water; and it is the more dangerous, as the sea commonly sets in with great impetuosity, the waves rolling in succession and with frequent breaks, especially with a fresh wind.*

On advancing toward this place from the westward, strangers have been advised to keep on the parallel of 6° N. and thence stand along shore to the N.W. head of the river; thus they avoid over-running their distance, and making the rivers to the south-eastward, which might be dangerous. The River Benin is, except in very clear weather, difficult to hit; indeed, were it not for vessels at anchor off its mouth, much time might be lost in finding it. It pours down a vast volume of water in the rainy season. The bar is very shallow and dangerous.

The course from Lagos to Benin River is S.E. ¼ E., and the distance 102 miles. In running toward this river, the water in general will be found to have a dark green colour, and be more shallow than any other part of the coast. The current between sets to the eastward and S.E.

According to the survey of the Bight of Biafra, &c., by Captain Vidal and the officers of the *Barracouta*, the N.W. point of the entrance of Benin River is in lat. 5° 46′ N., long. 5° 3′ E., which agrees very nearly with former results.

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* In the year 1788, Captain Landolphe founded a French establishment for a company called the Compagnie d'Owhyere. It consisted of a fort and a factory. It stood on the left bank of the river, near its mouth. It was very flourishing till 1792, when the war, consequent upon the French Revolution, caused its destruction. It was called *Boredo*, and was near Ouboby. Its position has been determined by Mr. Becroft.

There is a trade from this river in palm oil and ivory, the agents for which manage to exist amidst the surrounding pestilence and refractory trade-men. The palm-oil factory is on Battery Point, which is steep-to, carrying 10 ft. water up to the factory jetty. This point is 4 miles up on the southern shore, and 1½ mile above the village called Booby Town: besides which there are three villages on the North shore, one of them, Fish Town, standing just opposite to the factory; and on the round of the South point stands a fifth village, called Salt Town. From abreast of Salt Town the bar springs with heavy breakers which extend for 2 miles, and likewise a shelf of sand and mud of half a mile in breadth.

Close to the North side of the river, and opposite the jetty, an old merchant vessel was stationed as an hospital. She also served as a refuge for any boat's crew who by any accident have to remain during the night in this baneful atmosphere, which should be carefully avoided.

The land about the town is fertile, although but little of it is cultivated. Sheep, goats, pigs, poultry, and yams are plentiful and cheap; there is here, also, a breed of small cattle. Cotton, indigo, and the sugar-cane, appear to be indigenous.

According to Capt. Adams, whose acquaintance with the country was previous to 1800, the country called Benin is of considerable extent, and situated principally to the North and N.W. of the principal river. Into this river, at 9 miles from its entrance, on the North side, is the mouth of a wide and deep creek, leading to a town called *Gato*, or *Agaton*, where Belzoni, the celebrated traveller, died, November 26th, 1823, and was buried there on the following day. At Gato, vessels trading with Benin have their factories. Craft of the burthen of 60 tons can navigate this creek to within 4 or 5 miles of the town, which is more than 30 miles distant from Benin River; and the first dry land which appears, after entering, is near Gato—the intermediate country being a morass, covered with an impenetrable forest. The course of the road from Gato to the capital, Benin, is about N.E. by N., and the road passes over a country perfectly level, intersected with deep woods and swamps.

The face of the country surrounding Benin bears much the same character as that of Ardrah and Griwhee, excepting that it is more thickly wooded. The town is large and populous, containing about 15,000 inhabitants; it is built very irregularly, without any regard to order, and the houses are detached; consequently it occupies a large space.

The King of Benin is fetishe (sacred), and the principal object of adoration in his dominions. He was visited in 1838 by Messrs. Moffat and Smith, who found him to be a robust old man, who affected much dignity and would not allow them to approach his person. They were hospitably treated, but had many painful proofs of the barbarity of the inhabitants. In several places human remains were exposed in the most disgusting manner.

The *Kingdom of Warree*, or Warré, is situated to the South of the Benin River. Its first town, near the bar of the river, is called *Salt Town;* the second, 4½ miles more to the N.E., is *Bobee*, or *Lahou;* and the third, which is 19 miles higher, is *New Town*. The last is opposite *Reggio Town* and Point on the East side of the entrance of Gato Creek, and upon the East side of the mouth of Warree Creek, which thence extends S.E. to Warree, the capital of this state.

New Town, or *Young Town*, therefore, stands about 22 miles above the mouth of the River Benin, and it is a seaport town of the King of Warree. The captain of the river derives his power and consequence from being placed at Lahou, near the entrance, in order to receive the King's duties from vessels entering for the purposes of trade, and he makes a point of boarding every one that enters.* Since the decline of the slave trade, this place has been nearly deserted by traders. The population now amounts to 600 or 1,000, and from its unhealthy situation is exposed to much sickness.

The country between New Town and Warree is covered with an impenetrable forest, which grows upon land that seems composed of alluvion ; and, even in the middle of the dry season, water covers a large portion of its surface nearly to the depth of a foot.

The *Town of Warree* stands on a beautiful island, about 5 miles in circumference, and a little elevated above the surrounding country. The island is well cultivated, and has much of the appearance of an extensive park. Its subsoil is a tenacious red clay, of which the inhabitants make jars for holding water, and various other domestic utensils. These are baked in ovens constructed of wood, placed in the open air, and the oven is consumed while the pots are baking. From the great quantity manufactured, it seems that earthenware may constitute a considerable article of trade. The town is divided into two parts, distant from each other about half a mile. The most populous is that in which the King resides, and the total population is about 5,000 persons. Much trade is carried on with the natives of New Calabar and Bonny, to the eastward, who come round in their canoes for the purpose. A new route by the *Forçados River*, hereafter described, is just opening up to the town of Warree.

The government, says Captain Adams, although monarchical, appeared to us mild. Polygamy is common here, as in other parts of Africa; and the number of wives which the black monarch had exceeded sixty.

At Benin and Warree, when the intercourse is open, much palm oil and ivory may be obtained, and generally much cheaper than either at Bonny, Calabar, or Camaroons to the eastward.† The medium of exchange is salt; but accounts are kept in pawns, the value of one of which is equal to a bar in Bonny, averaging from 2*s*. to 3*s*. each.‡

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* Lieutenant Bold says that, on entering, vessels are boarded by the governors both of Bobee or Lobou, and New Town, with whom a deputy must be sent up to the King, with the usual presents (*Comey*, or *Custom*). The same form is necessary for the King of Benin, if you wish to purchase ivory, the chief produce of his dominions. The governors, it seems, must at once be mistrusted and guarded against, humoured and encouraged, their power being almost uncontrolled.

† For the particulars of trade, see Capt. Adams, p. 109 ; and Bold, p. 66.

‡ The country of Jaboo carries on a constant trade to Benin, &c., through the medium of connecting creeks; and its cloths, which are greatly esteemed, are much in demand to the southward. Some of the best are equal to those of Manchester ; but they are made in only two or three-inch widths.

Dr. W. F. Daniell says, "The shore from Fish Town to Jacqua or Waccos* Creek is composed chiefly of alluvial deposits, covered by dwarf mangroves, that project so far into the stream as to conceal its banks; and this is the common appearance throughout the river, except in those localities inhabited by the natives. At the aperture of the above creek two English factories are erected, in each of which a few white artificers and Krumen reside, under the superintendence of a head factor. These edifices are commodiously built of wood, somewhat after the Spanish style, and contain a number of apartments on a middle story, elevated above the adjoining swamps."

Within Jo Point is a creek called Calabar Creek. At 5 miles higher, on the opposite side, is another inlet, called Lago Creek, having an islet on each side of its entrance, surrounded by a mud-bank. The latter will be avoided by keeping over to the starboard shore until you are off the large opening called Gato Creek, where you may anchor abreast of the town of Regio, on the North, and New Town, on the South, in 3½ and 4 fathoms, near the *Warree branch* of the Benin, noticed hereafter.

Of the River Benin, Capt. Matthews says, the Bar extends about 5 miles off, that he never found on it more that 13 ft. of water, nor less than 8 ft., at spring tides. "In the rainy season the sea runs very high, and breaks quite across. When going over it, I always had the dead lights lashed in, and an anchor hung over the stern, to let go occasionally, and to prevent the ship coming broadside to the sea, in case you should be so near the ground as to lose the use of her rudder; but I never was under the necessity of making use of it, always getting in and out without touching the ground; although, at times, I had very little water to spare."†

The best season for traders to the Benin River is between the month of September and the latter end of February, during which period there are clear refreshing breezes with fine weather, and land winds favourable for going out; but beyond the month of February, as the weather changes, getting out is attended with difficulty and danger.

It is high water, on full and change, at 4^h 30^m; springs rise 7 ft. The pilot noted that it flows 3 hours, but ebbs 9 hours. The rapidity of the tide, in the rainy season, very often carries away marshy fields, of some acres in extent. You must be careful to steer the ship clear of them; otherwise, should they come athwart her, they will give you a deal of trouble.

In April, 1840, Mr. Beecroft, in command of the *Ethiope* steamer, manned by fifteen Europeans, and a full complement of Krumen, ascended the *Benin* or *Formosa*, with the intention of penetrating, if possible, to the upper course of the Niger or Quorra, by this means avoiding the pestiferous swamps of which the lower part of the delta of this river is composed.

For about 40 miles from the sea, including windings, he found the Formosa a fine bold river, with from 6 to 3 fathoms of water. At this point a bifurcation took place; both branches proving to be highly tortuous, and much narrower than the main branches of the river, but having a depth of not less than 3 fathoms so far as the steamer was able to ascend them. This Mr. Becroft computed to be from 40 to 50 miles on the one, and from 60 to 70 miles on the other, including windings. His further progress was obstructed at these respective points; not from want of water, for that continued as deep as before, but from the impenetrable forests of large aquatic plants, which choked up the streams in both branches, so as to render a further passage impracticable, except by cutting a way through them, which could only have been accomplished by considerable labour, and with great loss of time.

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* "Jacqua, or Waccas, is the largest town in the kingdom of Warree. It is erected on the right bank of a narrow tortuous stream, in a low and impenetrable morass 2 miles from the river. The population amounts to near 2,000."—*Dr. W. F. Daniell*, Medical Topography, &c., p. 43.

† The first Englishman who entered and went up this river was Thomas Windham, in 1553, in company with Antonio Anes Pinteado, a native of Oporto, in Portugal, appointed chief of the expedition. They traded there for Malagette pepper.

He afterwards entered what may be called the Warree branch of the river. This branch they entered by passing through a creek of some magnitude, called *New Town Creek*, mentioned before, flowing out of the Benin to the southward. They succeeded in reaching the Niger at the point of bifurcation with the Nun Branch, a short distance below the town of Eboe, in lat. 5° 27′ N.

In their progress thither, they passed three openings or passages to the sea, which they presumed to be the Rivers *Escravos*, *Forçados*, and *Ramos* as laid down in the charts. This navigation occupied a fortnight, during which time sickness appeared among the Europeans, of whom five ultimately died.*

From Benin River to the southernmost land of Formosa the coast of Warree, being the commencement of the delta of the Niger, extends S. by E. ½ E., 117 miles; and within this space it is broken by several rivers, as the *Escravos* or *Escardos*, *Warree* or *Forçados*, *Ramos*, *Dodo*, *Sengana*, &c., all supposed to communicate with the Niger. The coast is altogether a low, swampy, and unhealthy country, with a sandy shore, thinly inhabited, and, of course, but little frequented.

The first river, southward of Benin River, is the *River Esclavos*, or Slaves River, known also in native parlance by the name of *El Broder*, or *Brodero*. Its entrance is 13 miles S. by E. ¼ E. from Benin River, the coast between being thickly wooded with several clumps of conspicuous trees. There are heavy breakers over the bar, on which, in one place near the northern point, 8 ft. of water may be found; off the South point the bank stretches a good way into the sea. Adjoining its entrance is a small town erected on the margin of a sandy beach, and which is encompassed and partially hid from view by a profusion of palm and cocoa-nut trees.—(*Dr. Daniell.*) This river communicates with that of Warree.

RIO DOS FORCADOS (Galley Slaves River), or **River Warree**, is 15 miles S.S.E. of the Esclavos. The coast between winds round to the eastward. The entrance, in lat. 5° 23′, is wide, with an island in the centre. Mr. Consul Livingstone says that Warree is the chief seat of a brisk palm-nut kernel trade recently opened in Benin. Hitherto Warree has been reached through the tortuous channel of the Benin River, the distance by this route being reported as 150 miles from the sea, but by using the Forçados River (lately explored), the channel is deep, direct, with 20 ft. over the bar at high water, and a capacious harbour inside. A Hamburgh steamer, drawing 7 or 8 ft., came down from Warree by using this route in five hours, whereas the passage by the Benin River takes twelve hours with the tide. The natives are treacherous.

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* "Journal of the Royal Geographical Society," Vol. xi., 1841, pp. 184—190.

Forçados River belongs to Chinomé, son of Queen Doto of Warree, who is willing to have the river used, and offers to protect vessels trading to Warree by this route.

Dr. Daniell says :—"Both this and the Esclavos, from their shallow estuaries, are seldom or never frequented, although, in the seventeenth or eighteenth centuries, the Portuguese and Dutch carried on a lucrative commerce with them, especially the latter. At the distance of 3 miles from the entrance is the island and town of *Paloma*, the latter consisting of from twenty to thirty dilapidated houses, situated on the left bank of the stream. The inhabitants transmit what little palm oil they produce to Jackree; the majority of them are now fishermen, and chiefly occupied in the curing of fish. Formerly the Portuguese had a fort, chapel, and three or four factories in this town; but they were soon abandoned, on account of the extreme insalubrity of the climate. Jerome Merolla da Sorrento, in his *Voyage to the Congo*, informs us that two Capuchin missionaries, named B. di Firenza and A. Aiaccio, sailed from the Island of St. Thomas in 1683, to visit the metropolitan town of Warree, which by this route is about 16 miles to the N.E. of Paloma. They were the first persons that attempted to introduce Christianity into equatorial Africa, and it has been stated, converted many natives to its doctrines."

Without the river there is anchorage in 7 fathoms, muddy bottom. In the entrance there is 15 ft. over the bar at low water, and care must be taken to avoid a flat which extends from the S.E. side.

RIO RAMOS (or Bough River) is 14 miles S. ½ W. from the River Warree, its mouth being in lat. 5° 9′. The entrance is not quite half a mile in breadth, and, having no island in the vicinity, it may be easily distinguished from the former river. Heavy breakers extend 2½ miles off its mouth; the middle of the bar has about 9 ft. at low water.

Rio Dodo is 18 miles S. ½ W. from the Rio Ramos, with *Walker Island* in its entrance; its bar is impassable except by boats. There is anchorage in 4 or 5 fathoms off these rivers. The natives of the coast are said to be ferocious; and are, therefore, to be avoided. The shore continues low and woody.

From the Dodo to a point commonly, but very improperly, called Cape Formosa (being an island in the entrance of Middleton River), the distance is 24 miles. The coast between rounds more to the eastward than the coast to the northward, or S. by E. ½ E. This point lies in 4° 31′ N. and 5° 41′ E. The land hereabout is so low, that the trees upon it seem to stand in the sea; you, therefore, have them in sight before you descry the land. From 15 fathoms neither land nor trees can be seen. At 5 miles from shore, the depth is 5 and 6 fathoms. Between the Rivers Dodo and Sengana, there are the small branches named on the chart, *Pennington* and *Middleton Rivers*, and the *Winstanley Outfalls*.

Middleton River.—This river was surveyed in 1873 by A. MacEachen, Esq., F.R.G.S., who gives the following information. The entrance to the river, in lat. 4° 31′ N., long 5° 40′ E., lies between George Island to the westward and Miller Island to the eastward, a distance of about a mile. The channel outside these islands, about 2 miles long in a southerly direction, lies between breakers. *Factory Point*, on which Messrs. Miller's factory is situated, lies about a mile within, and to the eastward of George Island. About 1½ mile eastward of Factory Point is *Lobia Point*, on the same shore.

To enter, in coming from the westward, keep along shore in not less than 5 fathoms until George Island bears North, when you will be about 1½ mile outside the bar, to cross which steer for the West end of George Island, bearing N. ¼ W., then keep along the western side of the channel until within half a mile of George Island, when steer for Factory Point.

Inside of Miller Island there is excellent beaching ground, clay, with a few inches of sand on the top, and fit to beach any sized vessel on. Good shooting and fishing. A stream, called the *Bengo Torro*, flows into Middleton River, at the back of Miller Island.

Current.—In the months of July and August there is always hereabout a strong easterly current; so that it is proper, when you sail along the coast, to keep off at a considerable and safe distance; not approaching nearer than in 8 fathoms, which is 6 to 9 miles from land. The bottom is commonly so deep in mud, that the lead immersed in it is raised with difficulty.

At 21 miles S.E. ¾ S. from the West end of Miller Island, is a small river, called the *Sengana*, or *Sengma*. On the North bank of this river is a small town, enveloped in trees. On advancing, with the creek open, it shows with low land on the western, and a steep bluff on the eastern side. The coast thence to the *River Niger* is bluff or level. The distance between is about 6 miles S.E. ½ E. The bar of the River Niger, according to the survey, is in lat. 4° 16′ N., and long. 6° 4′ 30″ E.

" The River Sengana is the southern extremity of the Bight of Benin, and the obvious projection of the land in its vicinity may therefore be termed with more propriety Cape Formosa. This Bight, comprising a tract of coast of nearly 360 miles in extent, and excluding some parts of the slave coast, may be merely considered as one vast and almost interminable forest swamp, whose continuity is broken by the petty rivers and creeks that meander in all directions through it. It is, without exception, the most deadly portion of the West Coast of Africa."—*Dr. W. F. Daniell.*

THE RIVER NIGER.

At 319 miles S.E. ¾ E. from Cape St. Paul is the mouth of the River Niger, or as it has at various times been named, the Nun, the Quorra, or Kowara. To vessels of 6 or 7 ft. draught the Niger is navigable as far as *Egga*, a distance of 340 miles, during August, September, and October, during which time the river rises to its highest level, when vessels drawing 10 ft. can reach Egga.

The bar breakers spring out from the West point of entrance in a S.S.W. direction almost at right angles to the coast line, and then curving sharply to the eastward, form a sack-like belt of sand and breakers of half a mile in [illegible] a sufficient guide. [illegible] to show the [illegible] are to be mentioned.—[illegible]

[illegible] There is a small [illegible]

[illegible] village [illegible] chief's village. [illegible] miles [illegible] will be found [illegible] miles S.S.E. from [illegible]

[illegible] palm oil [illegible] miles from the [illegible] Several small [illegible] from Lagos to Bonny [illegible] Niger in the interior.*

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* [illegible] In Kame[illegible] it is at the [illegible] register. The value in English goods of a [illegible] about half-a-crown, of a 'little ting' a shilling, and of a 'big ting' about a pound."—*Journal of the Society of Arts*, Vol. XXII, p. 319, 1874. Paper by Mr. Consul Hutchinson.

We have already shown in the note, page 609, the commencement of the Expedition of Messrs. Richard and John Lander; and have now to add, that, under various perils and disadvantages, the Landers proceeded through the country to the north-eastward, until they reached *Yaoorie* or *Youri*, near the eastern bank of the Kwara, in the latitude of 11° 10′ N., or thereabout, and thence descended to the sea, by the stream ultimately found to be that called the *River Nun*, eastward of Terra Formosa, which they reached in January, 1831.

This important discovery produced the Expedition into the interior by the steam-vessels *Kuorra* and *Alburka*, in 1832, '33, and '34, of which a Narrative was drawn up and published by Messrs. Laird and Oldfield, surviving officers of the expedition. These interesting volumes show how far it may be practicable to open a direct commercial intercourse with Central Africa by the navigation of the river. "It is quite true," says an intelligent writer, "that the bold attempt failed; but the circumstances under which it was made deserve to be taken into account, before the experiment be utterly abandoned as unattainable. The chief difficulty with which the travellers had to contend was the climate, which produced excessive mortality among the crews. Against this no human skill can provide; but the authors prove that there is nothing else to prevent a communication with Central Africa by this route, though the contrary has been affirmed."

Boussa, or *Boossá*, is the place where, thirty years before, the adventurous Mungo Park unhappily perished.

Three months after leaving Liverpool, the expedition arrived at the mouth of the River Nun. For a distance of 30 miles up the river there was no land, not even mud, visible; the mangrove trees alone marking the channel. The inhabitants of this swampy country had a most miserable appearance, being covered with ulcers, Guinea worms, and cutaneous eruptions. The river, as it was ascended, grew wider, the banks were higher, and thick woods of stately trees succeeded to mangrove thickets. *Eboe*, at 140 miles (nautic) up the river, lat. 5° 40′, was the first town of any importance reached by the voyagers. This town stands by the side of a creek running nearly parallel with the Kwara, and in the flooded season communicating with it at both ends. On a rough estimate the town consists of 800 to 1,000 houses; and allowing, on an average, six people to a house, will give the amount of population, two-thirds at least of which may be considered as under fourteen years of age. The inhabitants are the most enterprising and industrious traders on the Kwara. The town itself, with its immediate vicinity, is unhealthy, owing to the swampy nature of the ground; few old people of either sex were seen, and a great number of young men appeared debilitated and aged. The chief trade at Eboe formerly consisted in slaves.

Spain began the slave trade in the oil rivers in 1503, and England shortly afterwards. Early in the nineteenth century the English slave trade was abolished, and in 1841, &c., Her Majesty's Government induced the native authorities to prohibit the slave trade still carried on by them in foreign ships. In the treaty made at the time, Her Majesty's Government agreed to pay to the chief of each river 2,000 Spanish dollars a year for five years, provided the chiefs and English traders could certify that, to the best of their knowledge and belief, there had been no slave trade during the year. The chiefs appear to have kept the treaty in good faith.

Palm oil is produced in immense quantities about Eboe, and is collected in small gourds, each capable of containing from two to four gallons, from which it is emptied into trade puncheons. Some of these, belonging to vessels in Bonny, were seen in canoes at Eboe; but generally the gourds are taken in large canoes to a market-place on the Bonny branch of the Kwara; which branch being dry in the dry season, the Eboe oil then finds its way through the *Brass Creek* eastward to the Bonny.*

At a little distance above Eboe, large branches issue from the river to Benin and Bonny; and higher up the Kwara is a noble stream, 1½ mile wide. The scenery continually improved, and presented an exhilarating variety to the crews of the *Kuorra* and *Alburka*, previously mentioned. But the fatal taint of disease was on board, and the affliction had already become too serious to admit of alleviation from cheerfulness of scene. Fifteen out of thirty-seven men died within a few days, and nearly all were indisposed; but the sight of the mountains which stretched across the river a little higher up gave hopes of a better climate, and helped to prevent the men from yielding to feelings of despair. They had now reached the town of *Idda*, or *Attah*, latitude about 7° 6′ N., long. 6° 45′ E., which is seated on a hill, overhanging the river in some places with cliffs 150 ft. in height. Of this place, Mr. Laird observes:—

It is healthy, and the only place we have yet seen in the river where a European could possibly exist for any length of time. It has many natural advantages, and on some future day will be a place of great importance. Situated as it is, above the alluvial soil, and at the entrance to the valley of the Kwara, it commands at present the whole trade of the interior; which trade, although trifling at present, it requires no prophet to foresee will, at some time hereafter, be immense.

Above Attah, otherwise Idda, the river forces its way through the chain of mountains. These mountains have all flat summits, of equal height, apparently from 2,500 to 3,000 ft. above the river. At the entrance to this beautiful part of the river is the town of *Bocqua*, where a fair is held on a sand-bank every ten days, to which some thousands of people resort, many of them coming distances of 200 or 300 miles. This fair is of three days' duration; it is attended by Eboe and Attah, and even Bonny traders from the South, as well as those from many towns from the N.E., North, and N.W.

"The river abounds in fish, the staple food of the inhabitants. Fruits are not plentiful on the banks of the river; plantains, bananas, limes, tamarinds, a species of plum, and pineapples, constitute the whole. The latter are exceedingly scarce, and the former by no means abundant.

"The intercourse and trade between the towns on the banks is very great, the whole population being eminently of a commercial character—men, women, and children, carrying on trade. The traffic in slaves, cloth, and ivory, is confined to the men; everything else being left to the other sex, who, to say the truth, are far the most difficult to deal with."

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* With regard to the increase in the quantity of palm oil exported from the different parts of this coast, in 1790 about 130 tons of oil were imported into this country; the amount went on gradually increasing till 1860, when it reached 40,000 tons, and at the present time (1874) the amount imported was 50,000 tons a year.—*Consul Hutchinson.*

The confluence of the two great rivers, the *Kwara*, *Quorro*, or *Kowara*, and the *Binué*, *Tchadda*, or *Shary*, is in lat. 7° 47′ N., long. 6° 43′ E., as shown by Dr. Baikie. The country above, which is beautiful in appearance, is very thickly peopled. The highest point reached by the *Alburka* was *Rabba*, below lat. 9° 14′ N., a town containing 40,000 inhabitants, situate in the centre of a populous country, and visited by Arabs from Tripoli, by merchants from Timbuctoo, from Bornou, Howssa, and those from the countries down the river, who trade with the European settlements on the coast. Subsequently (in September, 1840) Mr. Becroft, in the *Ethiope* steamer, ascended to within two hours of *Lever*, in lat. 9° 43′ N., when the current was found to be too powerful to make head against.

The British Government, deeming it advisable that the African trade in this quarter should be placed on a firm basis, and also prove a means of ameliorating the condition of the native population, an expedition was fitted out, consisting of three steam-vessels—the *Albert*, *Wilberforce*, and *Soudan*—fine ships, built expressly for the purpose. They found the lower part of the river under the authority of King Boy of Brass Town, which extended as far as Eboe, to which point the vessels reached without troubles. But here they began, disease attacked the crews, and they struggled on to Iddah, by the 10th September, when the *Soudan* returned with the sick. The *Wilberforce* soon followed, and the *Albert* alone ascended some 36 miles above the confluence of the Tchadda. The sad remnant of the expedition was rescued by the exertions of Captain Becroft. Such was the result of this fine expedition.

The most complete account of the Kwara is that given in Dr. Baikie's work, "Narrative of an Exploring Voyage," 1856. Dr. Baikie went out with a small iron screw schooner, the *Pleiad*, in May, 1854, and was to take Mr. Becroft, H.M. Consul at Pernando Po, as chief for exploring the Biune or Tsadda. But Mr. Becroft had died before his arrival, and Dr. Baikie undertook the examination.*

Mr. Winwood Reade says respecting the Delta of the Niger:†—"These streams, which belong to the many-mouthed Niger, are called '*The Oil Rivers*,' for the swamp is the natural plantation of palms, fruiting in bunches of golden-hued nuts which yield palm oil.

"The English oil-traders never live on shore. Vast hulks of East Indiamen, once floating palaces, now floating factories or stores, are the houses of the agents; while trading vessels sometimes remain three years in a river, their decks covered with a thatched roof. These ship-villages are governed by a council of captains, who punish thieves and mutineers, and act as a Court of Arbitration, there being a power of appeal to the Consul of Fernando Po, who visits the rivers from time to time in a man-of-war. Half a century ago the Delta was merely a slave-exporting land; and the palm-oil traffic is quite of recent date. In 1808 our import of the oil did not exceed 200 tons a year; at present they amount to about 50,000 tons. In this Delta of the Niger, the refuge of reckless and despairing men, Death, as if sure of its victims, throws off the mask. Once enter that gloomy land, and the impression can never be effaced. The rivers filthy as sewers; the slimy mud stinking in the sun; the loathsome crocodiles lying prone upon it, and showing their white bellies as they sullenly plunge into the stream; the foaming, shark-haunted bars; the hideous aspect of the people, whose bodies are usually covered with sores; the traders with their corpse-like faces—all this can be remembered, but cannot be described. The tribes which occupy the lower regions of these rivers monopolise the inland trade, and their chiefs acquire considerable wealth."

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* An interesting paper by the Right Rev. Bishop Crowther, entitled "Notes on the River Niger," will be found in the Proceedings of the Royal Geographical Society, Vol. xxi., p. 481; also an account of a journey from Lagos up the River Niger to Bida, by the Rev. John Milum, 1879-80, in the Proceedings for January, 1881, p. 26.

† The African Sketch Book, by Winwood Reade, 1873.

Seasons.—At the mouths of the palm-oil rivers the rains generally commence in the latter end of May or beginning of June, and gradually increase with strong S.S.W. and S.W. breezes during July and August. Towards the end of September they gradually assuage. In July and August heavy squalls frequently prevail; and in these months the wind rarely shifts from S.W. more than a point or two to the southward; the rain is incessant, except for an hour or two about noon. The description of the climate of Western Africa is given on pages 60—80.

The palm-oil season is from March to September, when it declines, and is out of season, but in fact it may be and is obtained all the year round.

Mr. Consul Livingstone, in his report for the year 1872, says:—This Consular district includes the oil rivers of Biafra and Benin, 800 miles of coast, and the Island of Fernando Po. Its chief exports are palm oil and palm kernels; its minor, ebony, bar-wood, ivory, and indiarubber.* Of imports, the staple are tobacco, rum, gin, cotton prints, gunpowder, muskets, salt, brass rods, and manillas. In all the rivers our agents trade only with the tribes that own the river mouth, and are not oil producers, but merely oil brokers or middlemen.

In 1866 sixteen British firms traded in these rivers, and one Dutch. This year (1872) the number of Liverpool, Bristol, and Glasgow houses is twenty-four, and there are two foreign (Dutch and German). These 26 palm-oil traders have 55 trading establishments in seven rivers, and employ 207 white agents, clerks, mates, &c., 419 black coopers, carpenters, cooks, and stewards from our settlements at Accra, Cape Coast Castle, and Sierra Leone, and 2,000 Krumen from Cape Palmas and other parts of the Kru coast. Most of the above live in large airy hulks, moored near their cask-houses on the beach; a few have houses on shore.

The river was surveyed by Capt. Allen, but was re-examined by Capt. J. W. Glover in 1857-9.

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* The indiarubber of Africa is obtained, not from a tree, but from a creeper. It is not an export of the oil rivers, but of the southern part of this district and beyond. By their clumsy mode of extracting the rubber the bush people invariably kill the vine, and it does not spring up. Its manufacture, therefore, recedes from the coast year after year.

VI.—THE BIGHT OF BIAFRA, FROM THE RIVER NIGER TO CAPE LOPEZ, INCLUDING THE ISLANDS OF FERNANDO PO, PRINCES, ST. THOMAS, AND ANNO BOM.

The navigation* of the *Bight of Biafra*† will, at all times, be found very tedious owing to adverse winds and currents, and light eddies of wind and calms, caused by the great height of the islands lying in the direction of the winds which usually prevail. The East coast of the Bight is, in one respect, rather deceitful. Near the sea the coast is of no great height, but has high hills or mountains at a distance inland; and these hills in hazy weather are liable to be taken for the sea coast itself, and thus the stranger may probably find himself aground, when he thinks he is 12 or 15 miles, or perhaps more, from the land.

I am sorry I cannot give any advice as to the smallest depth of water into which a vessel on this coast may stand with safety. My own practice is (in the night) not to go into less than 10 fathoms, between Bimbia and Point Suellaba; thence to the River Borea not less than 12 fathoms; thence to the Bight of Pannavia, 18 fathoms; and thence, nearly to Cape St. John, not less than 26 or 28 fathoms. Near Cape St. John, caution is required, as the cape itself is bold, and the current often runs with considerable force directly upon it. From Corisco to the River Gaboon, a vessel may tack in the night in 18 or 20 fathoms.

In the vicinity of the land the starboard tack requires a very careful look-out, owing to the general easterly tendency of the currents.

After passing considerably to the southward of Rolas Island, I have generally found it difficult to keep to the southward of the Equator, in all seasons, owing to prevalent S.W. winds and northerly currents; and I have never found any easting in the wind until after I had passed the meridian of 4° W., and generally not until the vessel had attained the longitude of 5° or 6° W., between the Equator and 2° to 2½° of South latitude.

Between the second degree of North latitude and the African shore, the currents almost invariably (except in the Harmattan season) run with velocity to the eastward, particularly between April and September; and a vessel bound to the windward coast in these months should *never* go to the northward of the above parallel, until she has attained the meridian of the place bound to; if a little to the westward of it, all the better; and should then make allowance for an easterly current of full 1½ mile per hour.

Between April and September it is probable that homeward-bound vessels may make a good run, by steering to the northward, when they have reached the meridian of 10° W., and thence shape a course towards St. Jago, guided, of course, by wind, weather, and current; but it is probable, in these months,

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[*] The following remarks on the navigation and directions for the Bight of Biafra, are by Captain Midgley, 1841.

[†] The term Biafra or Biaffra appears to be a corruption of *Mafras*, as the Portuguese discoverer named one of the rivers of the Bight *Rio de Mafras*.—Sir J. J. Lopes de Lima, "Ensaio," &c., livro II., part I., p. viii.

the wind in this track will hang from S.W. and W.S.W., with squalls and rain.

Notwithstanding a number of fair passages have been made in the above tracks, on mature consideration, I am still inclined to recommend the route to the southward of the Equator, as far as 20° West, as the most preferable, because the most certain; and it is surely better to sail with a fair wind, a favourable current, and fine weather, than to be annoyed with continued squalls and rain—to say nothing of the probability of adverse winds and calms—in a region proverbial for the diversity of weather.

It may be well to state, that these remarks on African navigation are more particularly intended to apply to heavy, deep-laden, and consequently dull sailing vessels; for in the African oil trade, capacity for carrying a very large cargo, at an easy draught of water, is considered to surpass every other quality a vessel may possess. Superiority of sailing is scarcely ever regarded as even of second-rate importance.

The Prevalent Winds which blow upon this coast from S.S.W., W.S.W., and West, nearly throughout the year, and during the wet season with much force, must have great influence on the current; which I have found from actual experiment prevails in 12 fathoms water, with some strength; and from my own experience, when at anchor on the coast, I think this depth of water may be considered as the general southern boundary of the influence of the tides, which, in 8 fathoms water, appear to set in a S.E. and N.W. direction, or nearly so,—the flood running towards the N.W. Off Bonny, in 6 fathoms, at low water, I have several times in the wet season (when the ship was at anchor) found the ebb tide setting S.E., and running more than 3½ miles an hour; when heavy freshes come down the river, in consequence of the interior of the country being overflowed by the heavy rains.

The Current along the coast between Formosa and Bonny runs generally to the eastward, at the rate of 1 to 2 miles, and in the wet season frequently nearly 2½ miles per hour; but it sometimes, though rarely, runs to the westward with great force. Several vessels from Fernando Po to Bonny (of course unprovided with chronometers) have found themselves off Cape Formosa; and I have known of instances of vessels being set still further to the westward. Should a vessel from Cape Badgley, or George's Bay, Fernando Po, and bound to Bonny, or New Calabar, having run 120 miles upon a N.W. by W. course, without seeing the land, or be in more than 15 fathoms water, it will in most cases be prudent to bear up N. by E. or N.N.E., and she will most likely make the land to windward of Bonny.

Anchorage.—A few remarks on the anchorage off this coast may not be altogether irrelevant; and without presuming to advise those already experienced in the trade, the following remarks and suggestions may be of service to the stranger.

Many windlasses have been capsized and broken, and anchors and cables have been lost, owing to vessels very improperly anchoring in shallow water, or too near to the bars of the rivers, for in such situations the sea runs very high in the wet seasons, and it is indispensable to have sail well set upon the vessel previous to tripping the anchor, or heaving in too much cable; and the action of the wind upon the canvass very materially contributes to the violent jerking motion of the vessel, when at anchor in a seaway.

Vessels should never anchor, during the wet season, in less than 6 fathoms at low water, calculating 7 ft. at the full and change for the rise and fall of tide in that depth of water; and should ride with a large scope of cable, if there is any sea, so as to have as little strain as possible upon the anchor—the elasticity of a large scope of cable will make the vessel ride much easier in a moderate depth of water.

Strangers to the navigation will find that the heavy short sea which sets in upon this coast, between the months of April and October inclusive, combined with the tenacious quality of the ground for holding, will require more than usual precaution, to prevent the loss of anchors and cables, and perhaps of windlass, bitts, and deck bolts: for off Bonny, and indeed all along this coast, the best of ground tackling, and a good and well-secured windlass, are pre-eminently necessary, as damages cannot be well repaired in the Oil Rivers.

Every vessel bound to this coast should be provided with a spare set of windlass pawls, previously well fitted in England; as these indispensable articles are frequently broken, and cannot be replaced in Africa.

These remarks may perhaps appear trifling or superfluous, but Bonny Bar has long been notorious for the number of anchors and cables lost in its vicinity; and in the wet seasons few vessels which have anchored outside come into Bonny, without more or less danger to their ground tackling.

The following remarks by Captain Boteler, on the coast between the Isles de Los and Sierra Leone, are so precisely applicable to this coast also, that I shall take the liberty of introducing them here, as an excellent warning to the mariner; only premising, that for this coast the months of April and October should be substituted for those of "December and April." Captain Boteler says (I quote the "Memoir of the North Atlantic Ocean," 8th edition, page 101), "The surf on this coast is extremely heavy; the rollers sometimes curling in 5 fathoms, and breaking tremendously in 3, or even in 4 fathoms. They may be, in general, expected between December and April, and chiefly about the times of new moon; and therefore, during this interval, vessels should avoid anchoring in shallow water in unsheltered places, especially in the vicinity of a large river, as the opposite tide tends much to increase the danger."

I do not mean to assert that the above is at *all times* applicable to the coast about Bonny; but it is occasionally so, in its fullest extent, about the full and change of the moon, in the wet season, or between April and October.

I have *several times* lost anchors and parts of cables by these rollers, when lying in 6 fathoms water, outside Bonny Bar; and upon two occasions, in strong S.W. gales, with a very heavy sea and flood tide, was obliged to run for the river, when the breakers were running directly across the Bar, and the channel could not possibly be distinguished, except by the marks on the land; very fortunately, the brig happened to be light; but these circumstances have forcibly impressed upon my mind the danger of anchoring too near the Bar.

DIRECTIONS.—*In beating up from Fernando Po to Bonny*, with a dull sailing vessel, between the months of March and November, it is generally advisable to work to windward along the western shore of the island, as far as "George's Bay," or even to "Cape Badgley;" for the current almost invariably runs much stronger to leeward along the North shore, and in its vicinity (which is one continued bank of soundings), than it does farther to the southward.

On reaching off from the vicinity of St. George's Bay, with winds from the S.W. quarter, vessels generally make the land about Andoney River, after running upon a N.W. by W. course. On making the northern land, if it lies E. by S. and W. by N., *and no river is seen*, still ply to windward. Should the land trend to the northward, the vessel will be to the westward of the land of Formosa.

If any river is seen with a narrow entrance, or even 2 or 3 miles wide, it cannot be Bonny, the entrance of which is 7 miles in width, from Foche Point to Rough Corner.

At 10 miles off the entrance of Bonny River the ground is pretty hard, and the depth of water about 6 fathoms; but at the same distance off the mouths of any of the other rivers the ground is soft; in many places pure mud, or mud and oaze; and the depth of water at 10 miles from the land will be about 10 fathoms. The shoalness of the water and distance from the land, together with the bottom being harder than any other place in the vicinity, is alone sufficient to indicate the proximity of the entrance to the River Bonny.

If, on making the land, or working to windward, a river should be seen open, go to the mast-head, and diligently examine the land to the *westward*; if there is any appearance of any other river within the distance of 9 or 10 miles, and if the *western* point of such second river can be made out or seen, *and at the same time* the vessel is in 10 fathoms water, with muddy bottom, at 10 miles from the land, you may rely upon being to the westward of Bonny; for in 10 fathoms water off the Andoney, the western point of Bonny River cannot be seen from the deck, and only very indistinctly from the mast-head in perfectly clear weather; and even then it will look like detached trees growing out of the water, unless the refraction, as is often the case, be very great. In 6 or 7 fathoms water, off Andoney, Rough Corner appears like a low, level, and tolerably bluff point; and when the River Andoney bears N.N.E., or even N.E., no land can be seen from the deck, to the westward of Rough Corner; but when Andoney River bears N.E., in 6 fathoms water, the breakers on the Baleur Sand may be seen from the foreyard, between half ebb and one-third flood, particularly if there is any wind.

Should *any* of the other rivers between the land of Formosa and the Andoney (except the Andoney itself), be made upon a bearing from North to N.E., *both* the headlands which form a second river will be distinctly seen from the deck, if the weather be tolerably clear, and the vessel is in 10 fathoms or less water; and when two rivers can be made out from the deck—one open, and *both* the headlands which form the other seen—it affords another proof that the ship is to the westward of Bonny.

Should a vessel make Bonny River bearing from N.E. to North, it will be readily known from its superior width at the entrance, the shallow water, and harder bottom than any other part of the coast; the River Sombreiro will also be seen open. (The Bonny and Sombreiro are the only two rivers on this coast which can be seen *well open from the offing* at one view.) The Sombreiro may be readily distinguished from its bluff head on the West side. When fully open it bears N.W.; and at two-thirds of the distance from it, towards Foché

Point, there is a remarkable gap or indent in the land. When this gap bears N.N.E., the eastern point of Bonny River cannot be seen from the deck. The breakers on the Baleur is also a sure mark for the Bonny. The Bonny and New Calabar Rivers cannot be seen fairly open at one view, until a vessel is very nearly upon the outer bar of Bonny River.

Be careful of estimating distances in this neighbourhood by the eye; the lead is the only unerring guide, and should be constantly used, *except* between the Sombreiro and Andoney; and about three-quarters of a mile may be allowed in practice for every fathom of water—that is, 10 fathoms may be considered as 7½ miles from the land, though (in reality) it is fully 9 or 10 miles off, and so in proportion; but within the limits above named, between the Sombreiro and Andoney, the New Calabar, Bonny, and Andoney Flats, and the Baleur Sand, run a very long way to the southward; and the land in this neighbourhood should not be approached within 12 miles, nor be more than barely seen from the deck, unless bound to Bonny River, and should always be approached with caution, as the tides have more influence in the offing than is generally supposed. At the above distance from Rough Corner the depth will be about 6½ fathoms at half ebb.

Bear in mind, that along the whole line of coast, from Cape Formosa to Andoney, the water shoals very rapidly in-shore of 5 fathoms, which depth is the general outer boundary of *muddy water*, and not far from the banks which form the bars of the various rivers.

As a general rule, no ship should go into less than 6 fathoms water. If intending to anchor, there is much less sea and better ground all along the coast, in 10 fathoms water, than farther in-shore. Inside of 7 fathoms there is a short heavy swell, and sometimes, in the wet season, high rollers, which cause a vessel to ride very uneasy. By anchoring in this depth of water, a vessel will have a good drift before she can go into danger, should any accident happen to her anchors or cables.

All along this coast, and especially in the vicinity of Bonny, constant and careful attention to the lead will be found indispensable. The lead lines should be constantly and carefully examined, or the ship may be placed in a dangerous predicament, Neglecting this has been the cause of more than one vessel striking upon the Bar of Bonny. If bound to Bonny it may not be prudent, in the wet season, to run to leeward of the Fourth River after sunset, or the strength of the current may set the vessel to leeward.

DESCRIPTION OF THE COAST.

The entrance of the River Niger has been before described: we now proceed to describe the several mouths of this great river, lying to the eastward of the main entrance. The first of these is the Brass River, 10 miles to the eastward, which is also known as the *Rio Bento* or *St. John*. The entrance lies between two tree-covered points. *Formosa Point*, low and wooded, lies between the Brass and Niger Rivers, and is the southernmost land of the delta.

BRASS RIVER (Nimbe Torro).—A. MacEachen, Esq., F.R.G.S., surveyed the bar in October, 1878, and in 1881 Lieut. A. M. Field, R.N., made a more complete survey of the river entrance. We have adapted Mr. MacEachen's directions to suit the later survey.

The Mission House, on the East point of the entrance of this river, is in lat. 4° 17′ 15″ N., long. 6° 15′ 30″ E. The entrance between the East and West points is 7½ cables wide, and for a distance of 2 miles within the Mission House, on the East side of the river, the shore is occupied by nine different merchants' factories.

The bar is formed by a spit extending in a curve from West Point 4 miles in a southerly and easterly direction, on which the water constantly breaks; 3 cables northward of the extremity of this spit lies Hartley Patch, which breaks, and is about a cable in diameter, with a channel along its northern side, called *Lee Channel*. As there is a constant break on Hartley Bank, the best guide is the breakers. Give the spit to the westward a wide berth, then haul along close to the eastward of the Hartley Bank, turning sharp round, and steering direct for West Point. Ebb and flood sets across this channel. A well defined shoulder of some hills on the West bank of the river, just open of East Point N. by W. ¾ W., clears Hartley Bank and the end of the spit, in 13 ft. least water.

By the later survey of Lieut. Field, the Swashway westward of Hartley Bank is now blocked up by the extension of the spit to the eastward.

Vessels drawing 15 ft. should not cross the bar unless in fine weather, and within two days before to five days after full or change. Vessels drawing 12 feet can cross at all times; but it is better for sailing vessels to wait for flood tide. On a vessel firing a gun and hoisting the pilot jack, a native pilot will board the vessel as soon as the bar can be crossed with safety.

In the rainy season the current sets swiftly to the eastward outside the bar; and from June to October heavy swells set in. Vessels are not safe anchored outside the bar under 5 fathoms.

In the rainy season, June to October, the flood tide is very little felt, but the ebb runs very swiftly, as much as 6 knots in the middle of the river, and fresh water above Fish Town Point. The ebb and flood have both an easterly set inside the bar; vessels will do well at all times to keep to the westward, which is also the best holding ground. Should vessels have to anchor in the face of strong ebb tide they must be very careful. All vessels drawing over 13 ft. should send inside for a pilot, unless the captain is acquainted with the river.

The following are the directions previously issued (by the later survey the fairway buoy is moored in 5 fathoms, 5½ miles S. by E. ¾ E. of East Point, and the other buoys are not shown):—

Vessels arriving off this river, and bound in, should anchor in 6 fathoms, about 1 mile W.S.W. from the outer or fairway buoy; from this buoy the entrance bears N. ½ E., distant about 5 miles, and the red turning buoy N.E. ½ N., 2¼ miles. The best time to cross the bar is at half flood; vessels drawing over 12 ft. must wait for the last of the flood, and if over 15 ft. draught they should not attempt it, as the tides run with great force, especially during the rainy season, when they attain a velocity of 5½ knots. On weighing, the vessel should stand towards the red turning buoy, passing it to the eastward, and when Akassa Creek is only just open of East Point bearing N. by W., westerly, steer in for it till the black buoy near the entrance of the river comes on with a whitewashed palm tree on West Point; passing on either side of the black buoy, the shipping will show out and may be steered for, anchoring in from 4 to 6 fathoms, mud, three-quarters of a mile above East Point.

A range of hills on the West side of Brass River, a few miles inland, terminates in a well-defined shoulder, which kept well open West of East Point, and bearing N. by W. ½ W., leads East of the red buoy and over the bar in 12 ft. at low water; when the depth increases to 15 ft., steer N.W. ½ N., and when the channel is fairly open, bearing N. by E. ½ E., steer in, passing West of the black buoy.—*Sub-Lieut. Sabben*, 1876.

The buoys moored off and in the mouth of this river cannot be depended on, as they are frequently washed away; it is advisable, therefore, to send into the river for a pilot, the charge being £10 in and out. It is high water, in the entrance, on full and change, at $4^h 30^m$; springs rise 6 ft.

Brass Town, 25 or 30 miles up the river, on the western side, is the seat of government of these regions, located upon a flat and denuded patch of ground within the recesses of the forest swamps, and barely elevated above the water of the creek that flows past it. To Europeans its *locale* is almost unknown. It has a population of 3,000, who are mainly dependent on the Ebo plantations for the means of subsistence. About 3,500 tons of palm oil, collected by Liverpool agents, are annually shipped from this river.

In 1838 the boats of H.M.S. *Viper* ascended this river for about 60 miles, and found it 400 yards wide and 9 or 10 fathoms deep, its banks fringed with impenetrable mangrove. On returning they kept along the western shore with a current running 7 knots, and when near the mouth passed into an opening, which, after following for 14 miles, communicated with the Niger 12 miles from the sea. The country as far as the town of Brass, on the eastern side of the river, was subject to King Ockei, of Brass; that on the western side, between this river and the Niger, was subject to King Ebeffa, of Brass.

From this stream to that of New Calabar, a distance of 50 miles, through which runs a small creek, the land is merely a low, desolate, and marshy jungle, heavily timbered with mangrove, and bounded on the verge of the sea by a beach of sand, the continuity of which is interrupted by the apertures of four inferior rivers. They have been denominated the Rio St. Nicholas, Sta. Barbara, St. Bartholomew, and Sombreiro. As these titles are decidedly of Portuguese nomenclature, it is probable that either Diego Cam, in his voyage along the coast from D'Elmina to the Congo, or Fernando Po, in his expedition to Benin, conferred such upon them.

St. Nicolas, *Filana*, *Tilana*, or the Third River, with from 3 to 6 ft. over its bar at low water, lies 10 miles to the eastward of the Brass River, the coast between curving southward. The river does not open until bearing N.N.W. It has a tapering bluff on the East side, and low land seems to cross the river within, having some round-topped trees on it.

Santa Barbara, *Sempta*, or the Fourth River, is 10 miles eastward from the Rio St. Nicolas. This river has a wide entrance; it appears with the West point low, and does not open until it bears N.N.E., when the easternmost bluff shows like a dolphin's head with the mouth open.

Rio San Bartholomeo, *Meas*, or the Fifth River, is 7½ miles to the eastward of Rio Sta. Barbara. About its entrance the land is low; it is wide, has two bluff heads, but highest on the East, and runs in a direct line to the northward, up the country, and opens when bearing North. The *San Bartholomeo Bank*, lying just off the entrance of this river, must be carefully avoided, as there is only 4 or 5 fathoms at 7 miles to the south-eastward of the Santa Barbara River.

Rio Sombreiro, *Dos Tres Irmaos*, or the Sixth River, is 10½ miles eastward of the Rio San Bartholomeo. It opens, when bearing N. by W., and makes with a large tapering bluff on the West side. There is a bank extending 3 or 4 miles from its entrance, on which at times is a heavy sea, rendering the entrance dangerous.

Mr. Finlaison says that a vessel drawing 12 or 14 ft. of water may proceed into Sombreiro River, it having a channel of one-quarter of a mile; the least water he found was 3 fathoms, in a N.E. by N. direction, the reef in a line bearing S.E.; the West point of the river, N.W. 3 miles; Foché Point, East; this was in mid-channel, between the reefs.

All the coast between the Six Rivers is thickly covered with mangrove, with a sandy beach, stiff clay and muddy bottom without, in 6 and 7 fathoms. The current is generally strong to the eastward.

NEW CALABAR RIVER.—*Foché* or *Fouche Point*, the western point of New Calabar River, is 7½ miles eastward of the Rio Sombreiro. Between is a bank of hard sand, said to extend from shore to the distance of nearly 4 miles, and as far to the East as Foché Point, where it is bordered by a line of breakers. The western extremity occasionally breaks very violently, but may be passed in 5 or 6 fathoms. Foché Point is a steep bluff, in lat. 4° 22′ 40″ N., long. 7° 0′ E., with some lofty trees.

The land along the western side of New Calabar River, for 30 or 40 miles up, is subject to King Amochree, of New Calabar. On the eastern side of the river, for 30 miles up, it is subject to King Phibia, of Okrika, a town situated 30 miles up the Bonny.

The country on both sides of the Bonny is subject to George Pepple, King of Bonny. His territory extends eastward to the River Andoney. Eastward of this the King of Opobo reigns, a small territory under King Ja Ja lying between; the latter king rebelled against King Pepple in 1873.

The Rio Real, or New Calabar River, was designated by the Dutch traders as New Calabary, and by the English as the Calbarine. In the last century it was much frequented by small sloops, that extensively traded for yams, manioc, and other farinaceous articles, then imperatively required by the larger slave ships of Bonny and other rivers to leeward. Besides vegetable and other exports, it yielded at periods no inconsiderable number of slaves from the Hackbous or Ebo country. The attention of the inhabitants is now directed to the culture of palm oil.

The estuary of the New Calabar and Bonny Rivers is 6 miles in breadth, the town of Bonny being 9 miles E. ¼ N. from Foché Point. The outer point, on the East, is called *Rough Corner*, and N.E. ½ N. from this, at a distance of 5 miles, is Peter Fortis Point, on the opposite side of the Bonny River, with four round trees on its extremity. There is a channel on each side into the respective rivers; but the middle part is occupied by a large bank, extending out to sea, and on several parts of which there is only 3 ft. of water, with one or two islets, and several spots nearly dry at low water.

Foché Creek, or *Gap*, is 3 miles to the westward of the extremity of Foché Point; on the middle of the coast between are a few houses.

According to Dr. Daniell, "the village of Foché, or Foko, orignally named by the Hollanders Wyndorp (from the abundance of palm wine, or Tumbo, procurable from its natives), consists of a number of scattered houses, indiscriminately erected around the point. It is inhabited by the river pilots and their families, who are mostly engaged in fishing, in which they are very expert. The aggregate number of the people is about 300. A deep and conspicuous indentation of the coast, 3 miles to the westward of the point, is called Fouché (or Foché) Gap. A few native huts may be strewed amid the evergreen brushwood that skirts its limits. Fouché Village and Point are decidedly the most healthy localities in New Calabar, from their favourable exposure to the daily sea breezes, and exemption from mud banks, with their natural concomitants—mosquitoes and sand-flies. The soil in the neighbourhood of the houses is a thin layer of sand upon a bed of alluvial deposits. The sandy shore in front of these habitations may be said to continue to the mouth of a narrow creek that obliquely winds behind the town towards the Gap, where it has been supposed to join the ocean.

"At 6 or 7 miles beyond Foché Point is *Youngtown*, scarce worth the name applied to it. It possesses about 800 inhabitants, the majority of whom are the slaves of a petty chief. Some tall and graceful cocoa-nut trees, with an occasional palm and banana, are the only objects that serve to dissipate the pervading monotony of mud and mangroves meeting the eye on all sides. A short distance from the creek is the entrance of another, through which the Bonny canoes pass when they attend the Ebo markets. The upper projection of the bank at its mouth is called *Juju Point*. Abreast of it the merchant vessels commonly anchor. Following a circuitous course for some miles to the N.W., it unites with one that passes by the chief town of New Calabar, 5 miles more to the North. This latter creek, after effecting a junction with that just mentioned, conjointly with it trends towards the Brass country, thus constituting an island, on the right bank of which, in proximity to the river, the metropolis of the kingdom is situated."—"*Medical Topography*," *&c.*, p. 80.

Many of the streets of New Calabar reach down in parallel rows to the water's edge of the creek, which is barricaded on its whole extent of shore at the entrances into the streets by stout and lofty palisading.

The River New Calabar, from the shipping to the oil-markets, affords a fine safe channel for vessels of fully 10 ft. draught. After passing *Ewaffa*, which is some 45 to 50 miles from the mouth of the river, the country improves very much, the mangrove ceases, and moderately high land, well wooded, speaks of great capability for any tropic growth.

"After much experience in surveying the rivers and creeks between Bonny and Brass Rivers, we are of opinion that these channels will greatly facilitate, at some not distant period, a very much more extended trade than there is at the present time, by giving easy access to steamers of light draught to the interior markets. At present business is carried on by tribes settling on the shore, who have neither the means nor the inclination to carry out measures to develop the enormous trade which the country can supply. These tribes act as brokers for the produce, and are very jealous of any interference with their markets, but no doubt, before long, the whole of the magnificent rivers, creeks, and lagoons, extending from Benin to Opobo, and forming the delta of the Niger, will be opened and navigated by suitable steamers, developing the trade of the far interior."*

Mr. Finlaison directs those bound to the River Bonny, or New Calabar River when running for Terra Formosa, to keep in the latitude of 4° 10′ N., and no farther to the northward. If in the daytime, you may advance as near as you please in 5 fathoms. On running along shore, at low ebb, thick clay-coloured water will be found at the distance of 6 or 7 miles from shore. With high water it does not appear thus at more than 4 miles off.

If bound to the New Calabar or Bonny, make Sombreiro River, and you may be certain where you are, for it does not open until it bears N.N.W.

After leaving Sombreiro River, you will find that the shoal before mentioned will oblige you to haul off a point or two; but, with daylight, you will see Foché Point before you get that length.

From Foché Point upward the coast of New Calabar River trends nearly North; the East point of the entrance is 3 miles above Foché Point, and between the latter and the middle bank, or Calabar Flat, it is little more than 1 mile. The depths above Foché Point decrease from 7 to 5, 3½, and 4 fathoms. At 3 miles, in mid-channel, above the eastern point, there is 5 or 6 fathoms.

The following directions for entering the river are by Lieutenant C. H. C. Langdon, R.N., who surveyed here in 1869:—A conspicuous bluff West of Peter Fortis Point, just open East of the bush on the East end of Breaker Island, bearing N.E. by E., until New Calabar River opens East of Foché Point, bearing N. by W. ¾ W., carries 10 ft. at low water over the bar of that river. This channel breaks right across in the wet season. The chart derived from the survey of the entrance of the Bonny and New Calabar Rivers, in 1881, by Lieut. A. M. Field, R.N., will be found of great assistance here.

In December, 1872, H.M.S. *Pioneer* ascended above the hulks (moored on the West side of New Calabar River, 6 miles North of Foché Point), to New Calabar Town, a distance of 17 miles, and by keeping within a quarter of a mile of the western shore, a regular depth of from 4 to 6 fathoms was found. The river above New Calabar Town is apparently much obstructed by shoals.

BONNY RIVER.—"The *Bonny*, or *Bani*," says Dr. Daniell, "was one of the first rivers which the Dutch, English, and Portuguese were acquainted with in this portion of Africa. From the sixteenth to the present century it was the favourite mart of the slave ships, when the exportation of human beings was a legalized traffic; and the number of slaves transhipped seldom came to less than 16,000 per annum. Since the extinction of this odious commerce, it ranks as the grand emporium of the palm oil trade, exporting many thousand tons of this lucrative commodity, and employing more vessels than all the rivers of the Bight collectively."

The bar of the Bonny River extends S. by E. from the great middle ground or flats; and its outer extremity is 7½ miles S.W. from Rough Corner. To the eastward of the bar, separated by a channel 1 mile in breadth, is a bank of hard sand, named the *Baleur*, which has an extent of 4 miles S.E. and N.W. Close northward of its West end is the *Inner Bank*, of 7 ft., marked by a red buoy on its western edge. A 2¾-fathoms shoal is said to lie 4 cables northward of it. The *Eastern Channel* into the river, called the *Portuguese Channel*, is between these banks and the Bonny Flats, which extend from shore; added to which is an outer bank, called the *Portuguese Bank*, lying to the eastward of the Patches.

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* For a chart of the creeks and rivers between Bonny and Brass Rivers, with accompanying notes, by Messrs. R. D. Boler and R. Knight, see the Journal of the Royal Geographical Society, vol. xlvi, 1876, p. 411.

Jew-jew Point is only a mile within Rough Corner; and at 3 miles higher, on the same side, upon the western bank of a creek, is the town of *Bonny*, off which some large hulks are moored, on which the traders reside. On the opposite bank, North of the latter, is the point and town of *Peter Fortis;* below which, on the same side, is a bank dry at low water.

At 4 miles from the mouth, on the East bank of the river, is situated the town of Bonny, called by the natives *Culomi*. The King and a few of the principal chiefs have their houses close to a creek on the North side of the town, which, during the rainy season, is full almost to overflowing, being nearly on a level with the floor of their houses. On paying visits, it is customary to pull up this creek in your boats, and land at the outer courts of their houses by pulling the boat alongside a pier of wood and clay embankment, and stepping from the gunwale into the court. During the dry season the creek is nearly dried up. *King Amachree's Town* is 15 miles above Bonny, with deep water in the channel between.*

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* "Trade and Travel in the Gulf of Guinea;" by J. Smith. A gossiping book, published at Easingwold, Yorkshire, 1851.

When the slave trade was active, it was computed that for twenty years not less than 20,000 persons were annually sold here, 16,000 of whom were natives of the country of *Heebo*, or *Eboe*. The remaining part were of the *Allakoo*, or *Brass Pan Country*. Fairs for the purpose were held every five or six weeks, at several villages on the banks of rivers and creeks in the interior; and large canoes, carrying 120 men, were employed in the navigation. The Heebos must inhabit a very populous and extensive country, and it is probable that the towns, at the mouths of the rivers along the coast, including New Calabar and Bonny, were peopled from the Heebo country. Amacree, King of New Calabar, and Peppel, King of Bonny, were both of Heebo descent, as well as many of the principal traders at both places.

These towns were probably first built and occupied for the purpose of obtaining salt, by the evaporation of sea water; because the country, from the sea board to 50 miles in the interior, is a vast morass, heavily timbered and unfit, without excessive labour, to produce sufficient food for more than a scanty population; and as the trade in slaves increased, these towns, particularly Bonny, grew into importance. The language also spoken at these places varies but little from that spoken by the Heebos, which proves a common origin.

The Heebos, in their persons, are tall and well formed, and they may be distinguished from other Africans by their skin having generally a yellow, bilious cast, although varying in some instances to a deep black. Their dispositions are naturally timid and desponding, and their constitutions delicate.

The neptunes, or large brass pans, essential in the trade with this coast, are used, during the dry season, by the creek and surrounding country people, for the purpose of evaporating sea water, to obtain its salt, which is here the medium of exchange, and a great trade is carried on with the interior country.—*Adams.*

Dr. W. F. Daniell, whose ethnographical acquirements make him an authority on these subjects, says that the different tribes inhabiting that maritime expanse of country comprehended between the Rio Formosa, in the Bight of Benin, and the Old Calabar River, have

The following directions for entering the Bonny River are by Lieutenant C. H. C. Langdon, R.N.:—Having arrived off the *black Fairway buoy*, from which Foché Point bears N. ¾ E. 8 miles distant, with the next buoy (*red*) in line with Rough Corner, bearing N.E. ¼ E., and Peter Fortis Point well open West of it, steer in for Rough Corner, passing to the westward of the *red buoy* in 3 fathoms low water; from this the *red buoy* off the north-western end of the Inner Baleur Bank, Rough Corner, and the Ju-Ju Bush, a double-headed tree on Ju-Ju Point, difficult to be distinguished by strangers, will be nearly in line; continue on the same course, passing westward of the red buoy, and of the 2¾-fathoms patch 2 cables N.E. of it, which will lead over the bar in 18 ft. low water springs.

After passing the patch, steer N.E. ½ N. for Peter Fortis Point, passing about 3 cables from Rough Corner, and keeping about the same distance off shore up to the shipping, when there is anchorage in 10 fathoms, mud, near the mail hulk.

Allowance must be made for the tide, the ebb setting strong over the Baleur Bank, and the flood over the western breakers.

From the red buoy of the Inner Baleur Bank a north-westerly course for Foché Point, avoiding the actual breakers, will lead through a 2-fathoms channel into *New Calabar River;* this channel forms the best means of communication between that river and the Bonny, but it requires buoying. A pilot or guide can generally be obtained at Bonny to take vessels drawing less than 12 ft. round Breaker Island into New Calabar River.

Vessels leaving the Bonny River may cross the bar in 15 ft. at low water, by using the old Man-of-War Channel which lies eastward of the Baleur Banks; when dropping down with the tide, they should anchor southward of Rough Corner Spit, until the next high water, when they may steer out S. ¼ E.

Caution.—Navigators are given to understand that no reliance can be placed on the buoys, as they are frequently either out of position or washed away; but should the buoys be gone, Rough Corner bearing N.E. ¼ E., with Peter Fortis Point kept well open West of it, will lead over the bar in the deepest water. Steamers drawing 18 ft. can cross at 2 hours' flood, those not drawing above 12 ft. can enter at any time.

Pilots.—The duty of piloting is performed generally by the masters of Liverpool merchant ships engaged in the palm-oil trade, who are far better acquainted with the navigation, and more trustworthy than the native pilots. These latter are stationed on Ju-Ju Point, and if it can be seen, the usual

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unquestionably derived their origin from one common stock. . . . The great parental source from which most of them have emanated are the Ebos of the Quorra, which, for the sake of perspicuity, it will be necessary to separate into three distinct classes.

1st. The Ebos proper, which include the natives of the Rio Formosa, Warree Island, Rio Escravos, Brass Town, and the Quorra generally.

2nd. The Ebos of the table land between the Quorra and Cross River, comprising the natives of New Calabar, the Bonny, and a portion of the inhabitants of the River Andony.

3rd. The Ebos of the country between the Andony and Old Calabar Rivers, which embrace the inhabitants near the coast, the natives of the several towns of Old Calabar, and of the entrance of Cross River.

signal, with a gun, will be attended to; or a boat may be sent up the river for one of the masters of the merchant ships, but she should not leave the ship later than 4 p.m.

At no time of the year should a vessel anchor off the entrance of the Bonny in less than 7 fathoms, with Foché Point North or N. ½ W., and with not less than 50 fathoms of cable.

Tides.—It is high water, on full and change, at Bonny Town, at $4^h\ 50^m$; springs rise 6 ft., and neaps 5 feet.

" The entrance of the Bonny presents a broad expanse of water, consisting of the mouth of the Bonny to the eastward, and the New Calabar to the westward. The former is the more considerable of the two, although they are both fine rivers, and can be entered at any time of tide by vessels drawing from 12 to 18 ft. of water. They are likewise deep inside, and the anchorages safe at all seasons of the year. On account of the great commerce carried on in the Bonny, *King Peppel* (who resides at Bonny Town, on the eastern bank of the river, near its mouth) possesses great wealth, and in his vanity assumes various titles, of which " Conqueror of the Calabar " is the most remarkable. Notwithstanding his large magazines, full of goods and specie, he always pretends to be poor; probably from the fear that were he known to be rich, some power, superior to his own, might be induced to attack him and his possessions for the sake of plunder. These magazines are at some distance from Bonny Town, but their exact situation is kept a secret from strangers." —*Captain Vidal's Narrative*, Owen, Vol. II., pages 383—5.

The chief produce of this place is palm oil, which is very plentiful. This traffic is, however, attended with much danger to the immediate actors; and great difficulty is experienced in obtaining seamen for the ships, as it frequently happens that few of the original crew return from that fatal coast. They sometimes lie for three or four months before they complete their cargo; and during this period the greater part of the ship's company not unfrequently become victims to the pestilential climate.

The new system, however, of steam-vessels making frequent calls at these ports to load the oil procured by agents who live on the coast, will do away with much of the former loss of life.

A vessel should take in a quantity of salt at the Cape Verde Islands, ship Krumen on the Kru coast, and touch at Fernando Po to complete water and purchase provisions. In the river the ship is roofed over, the oil casks landed, and the holds cleaned, fumigated, and whitewashed.

In the first year of legitimate trade after the abolition of the English slave trade (1807), 300 casks of palm oil were exported from the Calabar and Bonny Rivers. Twelve or thirteen Liverpool and Glasgow houses now trade in Bonny and the neighbouring rivers of New Calabar and Opobo. The export of palm oil from these rivers has reached 16,000 tons per annum.

The country surrounding this town is low and swampy, and at this season of the year (March) particularly unhealthy. The merchant vessels were losing many men daily, although every precaution was taken to prevent disease. They were nearly all covered in, and the men not allowed to go on shore or work in the sun, which is the chief enemy to the constitution in this climate.

The inhabitants of the New Calabar worship the sharks, which abound here, and call them their *jew-jews*. They seem to consider that the nearest way to heaven is through the digestive organs of a ground shark. In consequence of this devotion paid to the shark, it is considered in the New Calabar a great crime to kill him; for they say, "Who kill jew-jew, him go dam—but him jew-jew eat, him go *comartable*." These animals appear so well aware of their prerogative of protection, that they commit the most daring acts, and have been known to leap some feet out of the water to get hold of the men whilst working in the head of the vessel. Falling overboard is certain destruction, as they keep a constant watch upon all vessels lying in the harbour. The shark is esteemed a great delicacy at Bonny, and whenever it can be caught is greedily devoured, a former fetishe of Bonny being the *Gaana*, or *Iguana*.

Stock of all kinds (and even yams and plantains) is now very difficult to procure in Bonny, without paying a most extravagantly exorbitant price for it, and even then it cannot be procured in any quantity; vessels should, therefore, purchase their fresh stock, corn, &c., to windward. Pigs and poultry can be purchased tolerably cheap in barter at Frisco, Cape Lahou, Jella Coffee, Quitta, or Popoe. Iron bars, leaf tobacco, common kinds of Manchester cloth, gunpowder, and rum, are sure to be asked for. Knives and axes are also in demand. If the vessel is much pressed for time, it may be better to call at one of the settlements on the Gold Coast.

Capt. Midgley says:—"Bonny River abounds with many kinds of excellent fish, which is the only fresh diet which can be procured at anything like a reasonable price; but even fish cannot always be obtained, as this article forms the principal, indeed universal, diet of the natives. I believe the whole of the fish taken in Bonny are perfectly wholesome food, without a single exception."

The western side of Bonny River is very shoal to half its breadth across. All vessels must therefore keep the eastern side aboard after passing Rough Corner. The ship must be steered with great judgment; for in the channel, upon and near the Inner Bar, there is very little room for a large ship to yaw about. The soundings on each side of the ship will sometimes vary 18 inches.

After passing the Inner Bar, if the wind is well free and light, and the tide of flood runs strong, steer well to the eastward, towards the dry sand bank, as the flood runs through the Lee Channel in a W.N.W. direction, and taking the vessel upon her beam will set her over towards the western breakers, if this is not attended to. To the N.E. of the Inner Bar these breakers are very bold-to, having 4½ and 5 fathoms within a ship's length of them. To the northward of Breaker Island (a dry sand on the West side of the channel) the flood tide runs directly to the N.E. by E. into Bonny River.

In case of the ebb tide setting out of Bonny, a vessel may anchor anywhere in the fairway of the channel, to the *northward* of Breaker Island, as the ground is everywhere clean and good; but the tides are very rapid, and the ship will not lie very easy on the ebb.

The pilots are well acquainted with the channel, but require to be a little humoured, and spoken to mildly, and they must not be entrusted with the management of the vessel; all they ever do is giving directions for the best water in the channel.

The pilot's canoe frequently goes ahead to sound the channel, and make signals of the depth of water by waving a flag. They are very expert at this, and the soundings they give may be depended on; but care must be taken to examine their lead line, before the canoe leaves the ship, as it is rarely found correctly marked. The canoe never goes ahead but when the wind is scant, the weather is hazy, and the marks on the land obscured, or when the vessel is of great draught of water.*

It is dangerous to attempt entering the river with a scant wind, as the tides of both flood and ebb set athwart the channel, the flood running to the N.N.W. until it meets with the W.N.W. branch coming through the Portuguese Channel. The N.N.W. branch of tide sets into New Calabar River. The tide does not run fairly into the Bonny River until the vessel has got to the N.E. of the Portuguese Channel and of Breaker Island. The ebb tide runs about S.E. over the bar.

No stranger, even under the most favourable circumstances, should attempt going in without a pilot. When the pilot's canoe is alongside, everything not too heavy or too bulky for transit should be well looked after, however worthless the articles may be.

From Bonny River the land, which continues low and wooded, trends E. by S. (*E. ¾ N.*), 15 miles to the entrance of *Andony River*, which is blocked up with the hard sand bank, on which are breakers.

River Antonio, or Andony.—"This stream leads to the short Ebo country, a race inhabiting a range of table land, about 40 miles up the river. It also leads to the countries of the Mocoes and the Quas, in the latter of which the customs and language are almost identical with those of Old Calabar. There are two or three insignificant villages a few miles inland on the margin of the eastern bank."†

OPOBO RIVER, 17 miles E. by S. ½ S. of the River Antonio, is not conspicuous from the offing, but a house on Sandy Point, and the roof of a hulk ashore there, are visible 6 or 7 miles in clear weather. The entrance of this river was surveyed by Lieut. A. M. Field, R.N., in 1881. On the West entrance point are two conical *beacons*, 2 miles N.E. by N. ½ N. of which is *Sandy Point*, on which are several factories, and several hulks are moored off it in the river.

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* Do not send into Bonny for a pilot late in the afternoon, or after four o'clock, as several boats belonging both to men-of-war and merchantmen have been capsized, and their crews drowned, owing to the tide imperceptibly sweeping the boat amongst the breakers. After the ship is at anchor fire several guns, and perhaps they may be heard by the pilots. If it be daylight, let the royals hang loose, and the ship may be seen by some of the fishing canoes inside the bar. After all, the only certain and most expeditious way of procuring a pilot is to send a boat into Jew-jew Town.

† Dr. Daniell, "Medical Topography," &c., pp. 101, 102. He continues:—"Few individuals are aware of the fact that inland communication by water may be established between the Rio Andony and the Rio Volta without the necessity of undertaking a sea voyage. The route, per canoe, may be described as follows: - 1. From the River Andony to the River Bonny; 2. Thence to the New Calabar; 3. Thence to the Quorra by the creek below the town; 4. From the Quorra or Nun to the Rio Formosa, either by the River Broadway, below Ebo, or by the numerous petty creeks connected with the River Esclavos, all of which communicate more or less with Benin; 5. From the Formosa or Benin River to the town of Lagos by the Lagos Creek (passing East Lagos River and the Cradoo Lake); 6. Thence by West Lagos River by Badagry to Whydah and Grand Popo; 7. And thence by the creek and salt water lake past the Fort of Quitta to the town of Aooneh, and from thence to the Rio Volta. *Ibid.* p. 102.

From both entrance points, which are 1½ mile apart, shoals extend a considerable distance to the southward; the East spit is the shoalest, being almost dry at low water for some distance from shore, and having on it at a distance of 2½ miles S.W. by S. from East Point a shoal head of 10 ft., known as *Gierke's Daughter*, but beyond this the water shoals to 1 and 1½ fathom at 7 cables distant to S.W., on the bar. Between the outer edge of East Spit and the western breakers is situated the bar, which is reported to break during the rainy season, and to shift its position. A *black beacon buoy* is moored in about 2 fathoms, at 1½ mile S.E. by S. from West Point beacons.

To enter the river, bring the house on the pier at Sandy Point in line with a clump of trees on the North bank of the river, called *Foster Clump*, bearing N.E. by N. ¾ N., which will lead over the bar in 9 ft. least water, close eastward of the 6 ft. patch. Or bring the black buoy to bear N. ¾ E. in line with Miller's Factory, at Sandy Point, and steer for it on that bearing, and when the beacons on West Point come in line bearing N.W. by N. ½ N. alter course for them, and when clear of the spit extending from East Point, and the house on the pier comes in line with Foster Clump, proceed up the river in mid-channel. H.M.S. *Contest*, in 1876, crossed the bar with a pilot, finding not less than 12 ft. at low water springs, and deep water inside. Vessels of 16 ft. draught have entered at high water.

Great care should be taken at all times when standing in for Antonio and Opobo Rivers, as shoal ground extends 4 or 5 miles off, and the flood tide often throws a vessel in at the rate of 2 miles an hour. In general, from the River Sombreiro eastward, you may reckon to a short distance, a mile off shore for every fathom of water you are in.

At 19 miles eastward of Opobo River, is the entrance of the *Quaebo River*, into which there is a channel of 6 ft. deep between the shoals, which may be found by steering for the bluff West point when bearing N.W. by N. The factory is 3½ miles within the entrance.

From Andony River to the entrance of Old Calabar River the coast trends E. by S., 58 miles. The whole is very low, and covered with trees. It is bordered with sand, and exhibits no particular marks. The western point of Old Calabar River is known by the name of *Tom Shot's Point*.

OLD CALABAR RIVER.—The entrance of the Old Calabar River is between Tom Shot's Point* on the West, and *Backasey* or *East Head*, on the opposite side, the distance between being 11 miles N.W. and S.E. The position of Tom Shot's Point, as given in the survey by Captain Vidal, is lat. 4° 36′ N., long. 8° 19′ E. A break in the East Head, called *Backasey Gap*, is in lat. 4° 29′, long. 8° 32′. Efiat, or Tom Shot's Town, is a dirty and unimportant village, erected within the curve of the beach, and encompassed by mangrove woods.

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* Efiat is said to have got its odd English name (Tom Shot's Point) from the circumstance that the chief of the little tribe of fishermen who inhabit the vicinity formerly made salt from sea-water; hence our countrymen called him Tom Salt, which name by the natives was transformed into Tom Shots, as it now stands.

The following directions for the Old Calabar River are by Lieut. C. H. C. Langdon, R.N. :—

Vessels approaching Old Calabar River from the eastward should endeavour to make the large black can buoy with staff and ball, moored in 25 ft., mud, 5½ miles S.S.W. from Backasey Gap, from which a course of N.W. by W. ½ W. for 7 miles will enable them to sight Tom Shot's Breakers, and be in a position to proceed into the river.

Unless very sure of the position at the entrance of the river, it may be advisable to make the Backasey Buoy, whether coming from the eastward or westward.

Steamers can steer about N. by W. from Backasey Buoy to the red buoy off Tom Shot's Point, allowing at least half a point for the tide, and hauling to the S.W., should the water shoal to less than 17 ft. at high water. The mail steamers use this route.

Vessels intending to proceed at once into the river, having made sure of their position off the entrance by bearings, or by sighting Tom Shot's Breakers, should steer in N. by E. ¾ E., passing 1 mile to the eastward of them, taking care to guard against tidal influences, as the streams have been known to set both N.E. and S.W. across the breakers, remembering, also, that, as a rule, should the water shoal with hard bottom, the ship is too far to the westward; if with mud, she is too far to the eastward.

This course, N. by E. ¾ E., will lead close East of the red can buoy off Tom Shot's Point; when this buoy bears S.W., a N.E. by N. course may be steered for 4 miles to make a red nun buoy; leaving this buoy a quarter of a mile on the starboard hand, steer N. ½ W., with the entrance of the Great Qua River (which may be known by its eastern bank showing as a green point sloping down to the water's edge) kept rather on the starboard bow, allowing half a point for the ebb or flood. When Tobacco Head on the western side of the river (on which are some large trees making like a bluff headland, in shape similar to a boat's rudder), is open of Parrot Island (a conspicuous round island in the middle of the river, covered with high trees), bearing N.N.W., steer direct for it, keeping the head open, which will lead clear of Parrot Spit; then steer close along the East side of Parrot Island until Seven-fathoms Point on the eastern side of the river, covered with high straight mangrove trees, opens West of James Island, bearing N. ½ W.

A direct course should then be taken for James Island, keeping close to the mangrove trees, after passing which, keep James and Parrot Islands just touching; this course will lead over James Flats in 18 ft. at low water. Pass close round Seven-fathoms Point, and keep on the eastern side of the river, until abreast of Fish Town on the western shore, when the river must be crossed, and when Townsend flagstaff on the eastern shore is abeam, haul over again for the anchorage.

Vessels from Seven-fathoms Point may stand over for Cross River, and, keeping on the western shore, pass westward of the shoal off Seven-fathoms Creek. This channel is mostly used by the pilots.

In thick weather, when off Parrot Spit, should the water shoal with hard or sandy bottom, haul more to the eastward; if with soft or muddy bottom, more to the westward.

Townsend flagstaff, to the southward of Duke Town, is in lat. 4° 56′ 24″ N., and in long. 8° 20′ 46″ E., assuming that of Fernando Po coal store to be 8° 46′ 42″ E.

Tides.—At Duke Town it is high water, on full and change, at 5ʰ; springs rise 6½ ft., neaps 5 ft. The general strength being 2½ to 3 knots at half tide.

The following is principally composed of extracts from Captain Midgley's directions:—In approaching Old Calabar River from the *westward*, there are several difficulties which require great caution. The principal of these are the strength of the tide (the flood setting E.N.E., and the ebb in the contrary direction, that is to say, diagonally over the Tom Shot's Breakers), shallow water, low land, and very irregular soundings.

The Tom Shot's Breakers extend at least 10 miles in a southerly direction from the land; and at 2 miles from their extreme end was a bank of only 14 ft., and perhaps less, water, hard sand, upon which the barque ***Kingston*** struck very heavily in December, 1842. At a short distance southward of the position of this bank there is 4 fathoms water, over a mixed bottom of sand and mud, and 3½ fathoms, hard bottom, *quite close* to the South edge of the bank.[*] Vessels approaching from the westward will shoal the water quickly from 10 fathoms, and the bottom will be found getting harder; and this alone will be found quite sufficient to indicate the proximity of the Tom Shot's Breakers. Should a cast of 7 fathoms be obtained (no matter what quality of bottom), a vessel should *immediately* haul to the southward, keeping in no less water than 6 fathoms, until the East Head of the river bears N.E. or N.E. ½ N., and bearing in mind to haul to the southward whenever the bottom becomes hard; and when East Head bears N.E., or more northerly, a vessel of 20 ft. water may anchor upon soft bottom in 5½ fathoms, with perfect safety, at any time of tide.

But for vessels bound to Old Calabar, it is in all cases better to make the Island of Fernando Po, and, having obtained a departure, approach the river from the *southward*, allowing in the course for 1½ mile per hour of easterly current in the wet season. On nearing the river, the water will shoal rapidly inside of 9 fathoms (the lead should be carefully attended to inside of 15 fathoms), but with daylight and correct soundings there is no danger, if it is borne in mind, as a constant maxim, *not* to raise *any* of the trees upon the Tom Shot's land more than just to be seen topping upon the horizon in detached places to an eye elevated 18 or 19 ft. above the water, until a ship is sailing over the outer bar, or, in other words, until the East Head of the river bears N.E. ½ N., or thereabouts.

A vessel drawing 18 ft. water, *when outside the bar*, will be quite close enough to Tom Shot's land when the *extreme* tops of the trees appear like detached umbrellas upon the extreme verge of the horizon, when seen from the poop deck of the ship, or 18 ft. above the water in clear weather.

There is no danger whatever in the way of approaching East Head upon a

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[*] The following account of a shoal at the mouth of the river was forwarded to Captain H. D. Trotter, R.N., from Captain Becroft, dated October 29th, 1851:—

"The knoll with 2 fathoms water on it is due South, from the South end of Tom Shot's Reef, about 2 miles distant. To avoid it in coming from the westward, steer East in 8, 9, or 10 fathoms. If the weather is clear, so as to see East Head, get it N.E.; then steer N. by E. for the river of Old Calabar. Knolls and sand-banks get up and disappear in two or three years. Breaker Island is larger now, with trees on it."

N.E. ½ N. bearing, as any vessel may gradually approach any required depths of water for anchoring, upon an excellent bottom of soft mud, from which the water gradually shoals upon the same bearing to the outer edge of the great mud flat, which forms the outer bar of the river.

Besides the fairway buoy, before described, a *black* buoy lies in 3¾ fathoms, 1½ mile East of Tom Shot's Breakers, and 8 miles E. ¾ N. from Backasey Head; a *red* buoy lies in 5 fathoms on the western side of the channel, 3 miles S.E. ½ E. from Tom Shot's Point; and a *red* buoy lies in 3½ fathoms on the eastern side of the channel, 6 miles E. by N. ¾ N. from Tom Shot's Point. The position of these buoys are not to be depended upon.

The fairway channel East of Tom Shot's Breakers is 3½ miles wide, maintaining that breadth for about 11 miles in a N.N.E. direction, beyond which it is much narrower. To N.E. of the red buoy off Tom Shot's Point there is a detached 15-ft. shoal, on the eastern side of the fairway.

Tom Shot's Point is a low and level elbow land, gradually rounding off to the northward, and has no point or protuberance whatever; except, indeed, the entrance of a narrow creek, at the extreme northern termination of the Tom Shot's Breakers, may be called so. An extensive mud bank here lines the coast. On the banks of this creek stands the town of *Efiat*, which is situated upon Tom Shot's Point; and at a mile or two to the northward of Tom Shot's Town there were two enormous trees, standing about three-quarters of a mile or a mile nearly North and South from each other, and which by their immense height, size, and spreading foliage, form a very conspicuous mark, and, when seen from the offing, really appear as if standing upon the nearest part of Tom Shot's Point.

Parrot Island is thickly studded with tall and remarkably level mangrove trees, of a very verdant appearance, so level, that the trees will appear like a well-clipped garden hedge, and apparently growing out of the water; indeed, it is scarcely possible to find an uncovered spot upon Parrot Island at high water. The mouth of *Great Qua River* may be known by a low bushy and verdant prominence on its South side, and which, at a distance, looms like an island.

Give Seven-fathoms Point a berth of 60 or 70 fathoms, and, as you stand on along the Bush, you will immediately see the E.N.E. or Duke's Town reach of the river come open. Now haul across the river, and when the ships can be seen lying before Duke's Town, or you can see along the southern shore of the river, steer directly across the river for a part of the land lying halfway between a remarkably wide and conspicuous creek, and the first clump of tall trees. Steer along the North shore at the distance of 60 or 70 fathoms, as it is bold-to; and when Henshaw's Town comes open of the bushes, steer towards Cobham Town, and take up any convenient berth in 19 to 24 ft. at low water, pretty close to the beach in front of Duke's Town.

On passing Seven-fathoms Point, on the eastern side, 30 miles above the bar, it is (or was) customary to salute with three guns; and also to fire guns on passing Henshaw's Town. Immediately on anchoring off Duke's Town, the customary and required salute is 7 guns, which is returned by 7 guns from the beach.

The tide at Duke's Town flows at 5^h, on full and change, and rises about 6 ft. During the rains, the ebb tide on the surface runs longer than the flood; but I have very often observed, and carefully noticed, that the tide rises nearly a foot at springs, before the ebb has done running on the surface; that is, the flood tide, as I think, first runs up underneath, and swells the water. In the wet season the ebb tide runs with great force, bringing down enormous trees, and sometimes small islands of vegetable matter, for which a careful look-out should be kept.

Below Parrot Island, the great strength of the ebb tide setting out of the various creeks and inlets will be found to require much precaution, particularly between Great Qua River and Tom Shot's Breakers; for here the freshes run with so much force (setting directly over the breakers), that if a vessel once starts an anchor, it may be difficult to bring up again, especially if a ship happens to drive near the breakers, where the bottom is of hard sand.

The salt water flows no higher than Parrot Island; from whence, to Seven-fathoms Point, the water is brackish; but at Duke's Town it is quite fresh.

" On the eastern bank, about 5 miles from Seven-fathoms Point, the mangrove woods stretch to the village of Henshaw Town, where the land suddenly rises. This place consists of little more than a dozen houses, erected on sandy patches, divested of their dense herbage. The population is about 200, mostly dependent on the chief from whom the village derives its title. A long and narrow path leads to the river, fringed on both sides with the forest brushwood, and on its lower slopes by a sward of thick grass, amid which are the graves of a few Europeans. Adjoining the landing-place of this hamlet is the outlet of a spring of fresh water, from which the shipping is supplied. It is not an easy matter to discover this watering-place, on account of the tangled thickets that encompass it. From this spot a somewhat precipitous and closely wooded eminence, about 200 ft. in altitude, encroaches on the river, and constitutes the southern limit of the Old Calabar Town.

" *Attarpah*, or River Town, the metropolis of these regions, is pleasantly located upon an easy acclivity, within a semicircular amphitheatre, facing the river, having a background formed of verdant woodland of moderate height. The town is chiefly built on an inferior slope, the houses being clustered together in irregular groups that approximate close to the beach. The streets, in their outlines, are similar to those of the other African towns, and are merely tortuous and intricate bye-paths, rendered difficult to thread, from the mud walls and foliaceous fences of the adjacent domiciles effectually concealing all objects but the arid sand with which they are strewed. The houses of Old Calabar are far superior in their construction to those of any other nation in the Bights."—*Dr. W. F. Daniell.*

" The most remarkable houses are the massive wooden mansions of the king and chiefs. They were originally built at Liverpool and Fernando Po, and have been reconstructed by European carpenters. They are spacious within, and elegantly fitted up with magnificent mirrors, chandeliers, &c., intermingled with expensive articles of *bijouterie*. They serve as the ordinary lounge of the white traders, and are excellent temporary hospitals for the white valetudinarian."*—*Ibid.*

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* NOTE.—For strangers bound to Bonny, or the New or Old Calabar Rivers, it is decidedly the wisest plan to go to Fernando Po, where for a few dollars a trustworthy

Duke's Town, or Old Calabar, is the place at which vessels trade, and off which they are moored. This place is about 25 miles from the sea, on the S.E. bank of the river. The land about it is moderately elevated, dry, and habitable. The people of this and the neighbouring towns have, for a long period, dealt in the productions of the soil, and export annually about 7,000 tons of palm oil, besides ebony, barwood, and ivory. The oil is purchased by the tub (*cruee*, or *crew*), of 9½ gallons, the price varying according to the demand. Salt being always in demand, vessels from England may take of that article the amount of their register tonnage, beside a well-assorted cargo of other goods. The currency of the country is copper rods. Many of the natives here write English—an art first acquired by some of the traders' sons, who had visited England, which they have had the sagacity to retain, having schoolmasters who instruct in this art the youths belonging to consequential families.

Strangers to the river may come to an anchor off the entrance, and send up to Duke Town for a pilot, who, though incapable of conducting the ship, will point out the proper channel; and trading vessels are required to obtain one by the ceremony of a letter to the Duke of Calabar, without which the trade may not be free.

Much form and ceremony among the chiefs is required before a vessel is allowed to trade. The practice has been to salute with two guns at Henshaw Town, and seven at Duke Town, where a formal visit, to announce your arrival to the Duke or chief, is required. From this application the king will, on the following day, proceed on board to receive his *comey*, or *custom*, which is exorbitant, but indispensable.* The measures in use are the cruee and powder-keg. The cruee, of 9½ gallons, serves for oil, salt, and pepper. The powder-keg contains little more than half a pint. The *comey cruee*, for salt, contains 5 lbs. only. A good supply of rum is necessary, in order to give a proportion to each trader, besides a small dash, or present, of cloth.

At 2 miles above Duke Town, on the same bank, is Old Town. These towns stand on tolerably high ground. At 2 miles above Old Town, a creek on the right or western side leads to *Creek Town*, the residence of King Eyo, the great man of this country. It is about 7 miles above Duke Town by water, but not more than 3 miles in a straight line. A large palm-oil trade is carried on in

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pilot may be procured. This will perhaps save the ship four or five days, and avoid other misfortunes, which are so difficult to be remedied here. The Mail steamers always take a pilot from there.

* In 1845 the Calabar chiefs entered into a treaty with the English Government to abandon the slave trade, which treaty has been faithfully observed. They at the same time solicited that instructors should be sent to them in the industrial arts. By special invitation from these chiefs, the United Presbyterian Church located its mission, contemplated for the West Coast, in Old Calabar. The mission has stations occupied by Europeans at Duke Town, Creek Town, Ikunetu, and Ikorofiong, and it is extending its influence in the interior of the country by means of native agents. A school is established at each station and out-station. The native language is now written, and the missionaries have given therein the Scriptures and various other books, especially for school and church use. Though several of the European agents, unsuited to the climate, have fallen victims to it, yet it is found not at all deserving the bad name which it gets as an unhealthy region.—*Captain J. B. Walker, F.R.G.S.*

this river, and ships of 800 or 900 tons lie many months off Duke Town. The annual exportation is about 7,000 tons from this river. The water at Duke Town is fresh, but not fit for use. There is a small watering-place at Old Town.

Missionaries have been labouring here since about 1846. They have built comfortable houses in Duke Town and Creek Town, and established schools; and they do not complain much of the climate, for several ladies, some born in England and others in the West Indies, have resided here for two or three years at a time, only going over occasionally to Fernando Po for change of air.

The *Old Calabar* was ascended in a steamer by Mr. Becroft and Mr. Oldfield, who went above Duke Town and the villages called *Guinea Company*, but found that it is a river quite unimportant, beyond the influence of tide. It is probable that it is an independent river, and not connected with the Quorra. *Cross River*, which falls into the estuary, as it may be termed, 24 miles from the sea, was ascended by the same gentlemen; and as it comes from the N.W., it may be part of the Niger, or Quorra, and forming, as it were, a part of the delta of that river. The particulars of the ascent of these rivers will be found in the "Geographical Journal," vol. vii., page 195, and vol. xi., page 189; and in the same work, vol. xiii. (1843), page 197, it states that Mr. Becroft "ascended the *Old Calabar River* about 300 miles," which will confirm the above supposition that it is an independent river.*

The Seasons.—Although nature here is apparently in a ceaseless state of verdant vegetation, the seasons vary as sensibly as in more temperate regions, contributing to the decay of old and regeneration of new fruits and plants. The spring commences about November, and the hot months of summer continue until May, during which period the weather is clear and fine, but excessively hot, with occasional tornadoes. From the middle of June the rains gradually increase, and continue in all July and August, descending during the latter in torrents. This period may be considered as the winter, and during it the inhabitants are afflicted with colds, fluxes, fevers, &c. In September, October, and November, the country is entirely enveloped in exhalations, which the natives term the *Smokes*, and which are exceedingly injurious to the European constitution. In this season fumigations of tobacco through the vessel, with smoking, have been found efficacious in repelling the pernicious effects of the vapour.

It is advisable for those who intend to remain for a season in the river to have a housing over the vessel, in order to preserve the health of the crew, as well as the ship's decks and sides, which will otherwise be materially damaged by exposure to the sun during so long a period.

The chief commodities are palm oil, ivory, pod pepper, and red wood. The palm nut arrives at its maturity toward the latter end of February, or beginning of March; sooner or later, as the weather may have been favourable or otherwise. This, consequently, regulates the season for trade; and the natives, it is to be added, are frequently occupied at the plantations until near the end of April, when the palm-oil trade commences.*

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* For further information relating to these rivers, see a paper, "Notes of a Visit to the Old Calabar and Qua Rivers, &c., in 1875," by Capt. J. B. Walker, in the Proceedings of the Royal Geographical Society, No. III, Vol. xx, 1876; also an account of the ascent of the Old Calabar or Cross River, by the Rev. S. H. Edgerley, 1881, in the Proceedings for February, 1882, page 94.

RIO DEL REY, &c.—The Rio del Rey, or *King's River*, is separated from the Calabar by the peninsula called Backasey, which, on its southern part, is nearly 12 miles broad. From East Head the land trends to S.S.E., 4½ miles, to *Backasey Gap*, and thence E. by S. ½ S., 8 miles, to a bluff and rocky point called *Backasey Point*, at the entrance of the river, and from which the coast bank stretches 2 miles to the eastward. A broad mud-bank surrounds all the southern coast, as already described, and continues up on the western side of Del Rey River.

Those bound to this place may be directed by the high lands to the eastward and N.E. Toward the East, between the parallels of 4° and 4° 24′ N., are the elevated *Camaroons Mountains*, the highest peak of which, in lat. 4° 13′ N., long. 9° 12′ E., is 13,760 ft. in height above the sea. At 18 miles to the northward of the Camaroons are the *Rumby Mountains*, 27 miles in extent North and South, and the highest peak of which is in lat. 4° 57′ N., long. 9° 18′ E. An insulated mountain, called the *Qua Mountain*, stands at 25 miles to the N.W. of the Rumby Mountains; its summit is in lat. 5° 15′, long. 8° 51′ E. In clear weather the summit of the Camaroons may be seen at a great distance, and, although so near the Equator, is frequently capped with snow.

On the Survey, 16*th April*, 1826.—"Quitted Old Calabar for Rio del Rey, a distance of 12 miles, passing Backasey Gap, a creek communicating with the Calabar, but through which there is no passage for vessels of any burthen. This was examined by Mr. Rogier, who had the command of two boats for the purpose. Upon entering, he landed at *Fishtown*, a village from which all the inhabitants fled with the utmost precipitation, leaving everything they possessed, even to their arms. The huts resemble those in general use along the coast; but one custom peculiar to this people is in the disposal of their dead, whose bodies, instead of being interred, were placed under an open shed, on a slightly-elevated platform, with a bowl of rice or other grain near the head.

"The Rio del Rey is generally represented in the charts as of considerable magnitude, which is, in fact, the impression it naturally conveys on being approached; but that which is taken for the river is in reality but an open, shallow bay, with several creeks branching from it, and one larger than the rest, 4½ miles wide at its entrance, but rapidly decreasing into a narrow channel. The bay is formed on the eastern side by the lofty Camaroons Mountains. The shores are thickly peopled; the inhabitants appear to live principally upon fish; as we saw from forty to fifty canoes every morning depositing the produce of their nightly labours on the beach. The villages are large, and, unlike those to the southward, are built on the skirts of the bay, and exposed to view from the water. This feeling of security is produced by vessels seldom seeking slaves in the river; but still these people are a timid race, and we had great difficulty in holding any intercourse with them. They would frequently come off in their canoes full of men, and a chief seated in each; but, when near the vessel, they would suddenly turn round and paddle to the land in the greatest consternation."—*Owen*, vol. ii., page 361.

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* There are two kinds of palm oil from the lowland countries of equatorial Africa. The first is of a thick or butterlike consistency, in colour a paleish yellow, but often of very inferior quality. It is brought from the table lands of Ebo in canoes belonging to the native traders of Brass, Bonny, New and Old Calabar, &c. The second variety is always recognised by its greater fluidity and rich golden tint; its specific gravity predominates over the former, and, therefore, is less liable to adulteration. It is chiefly produced in the Camaroons River, and in the Subo districts of Benin River, and is highly appreciated by the old merchants of Europe.—*Dr. W. F. Daniell.*

With the Peak of Camaroons S.E. ¾ E., that of the Rumby Mountains E.N.E., and that of Qua Mountain N.E. by N., you will be without the Bar of the Rio del Rey, at 7 miles to the S.S.W. of Backasey Point. The channel thence rounds to the N.E. into the river, and the coast eastward forms a bay, 12½ miles in breadth, filled by alluvion from several rivers, and over which the water is very shoal; for even in the channel to the river the depths are only 2, 2½, and 3 fathoms, muddy bottom. This river seems to be no longer a place of trade; yet it is said that Rumby, on the East, abounds in an excellent species of ebony, which may be had cheap, as well as provisions of all sorts, hogs, goats, yams, &c., provided you are well guarded against the natives.

"This river (Rio del Rey)," says the old English pilot, "affords abundance of large elephants' teeth, which they commonly barter for copper bars, counterfeit coral, beads, knives, &c.

"The country, far and near, is all low and marshy ground, affording little or no fresh water.

"Here a European must look for himself; for the inhabitants are so subtilly mischievous, that you will be betrayed before you are aware; and they are so barbarously cruel, that the parents sell their children, and the husband his wife, one brother and sister the other; and, in decency and order, are scarcely a degree above the beasts."

This description was written in the seventeenth century, and we do not find that the inhabitants have improved since that time.

CAMAROONS MOUNTAINS.—There are few spots on the earth's surface where more of grace and grandeur, of beauty and sublimity, are found blended in one noble panorama than at the equatorial approach to the West Coast of Africa. The voyager's eye, fatigued by the low, flat, melancholy shores of Benin and Upper Biafra, rests with inexhaustible delight upon a "Gate," compared with which Bab el Mandeb and the Pillars of Hercules are indeed tame. To his right, towers Santa Isabel, the Peak of Fernando Po, marked in the chart as 10,700 ft. above the sea-level: on his left is a geographical feature more stupendous still, where the Camaroons Mountain, whose height is popularly laid down at 13,760 ft., seems to spring from the waves, and to cast its shadow halfway across the narrow intervening channel, whose minimum breadth does not exceed 19 miles. They are evidently sister formations, these giant pyramids; they wear a family look; their shoulders, clad in flowing garments of evergreen vegetation, converge gradually, and almost continuously, at an angle of about 12°, till they meet at a neck upon which a superimposed conical head denotes the great central spiracle. In the island, however, superior humidity prolongs the woody region, whilst the continental mountain, some 3,000 ft. more elevated, shows a greater expanse of grassy surface clear of high

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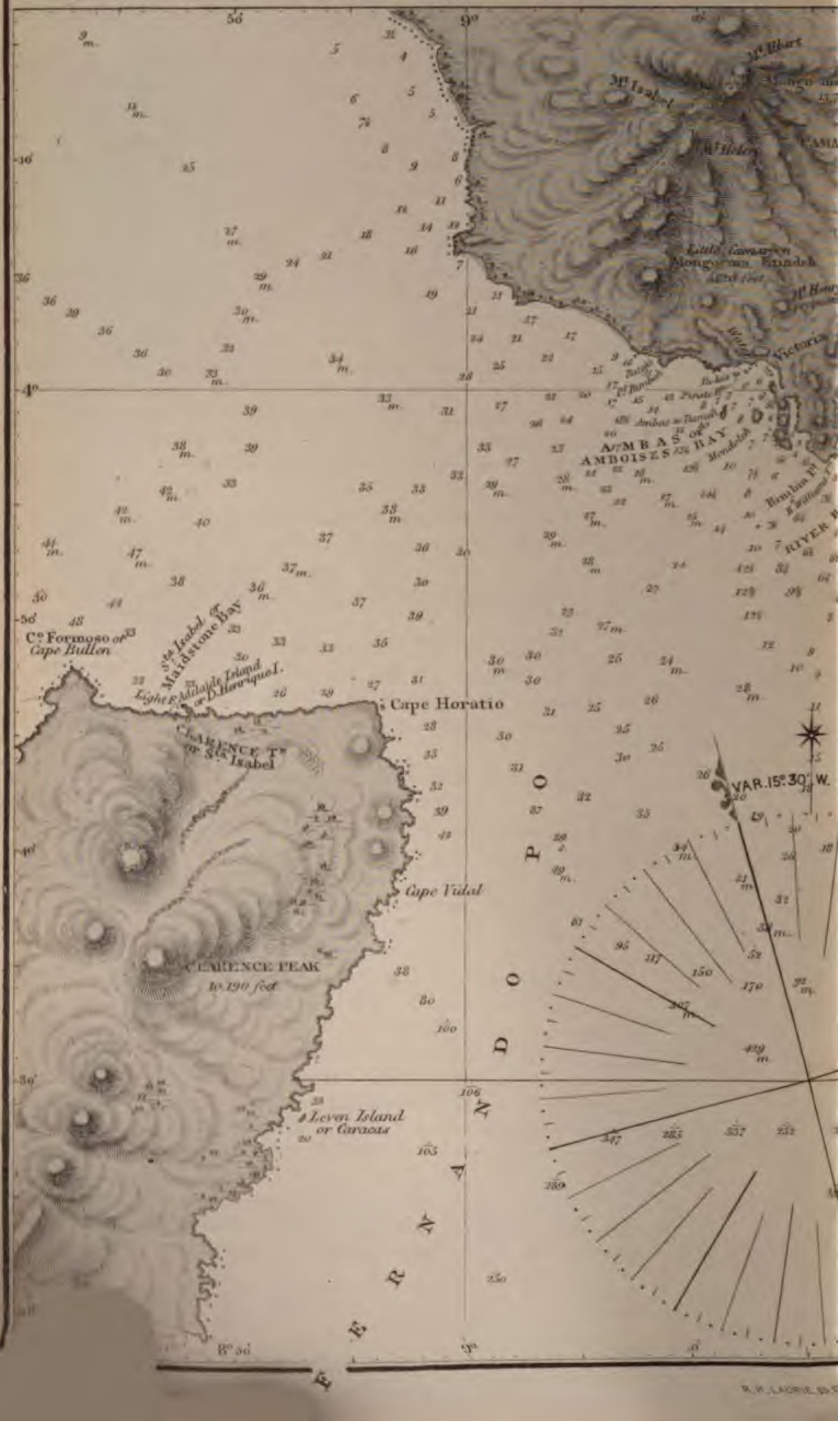

R. H. LAURIE

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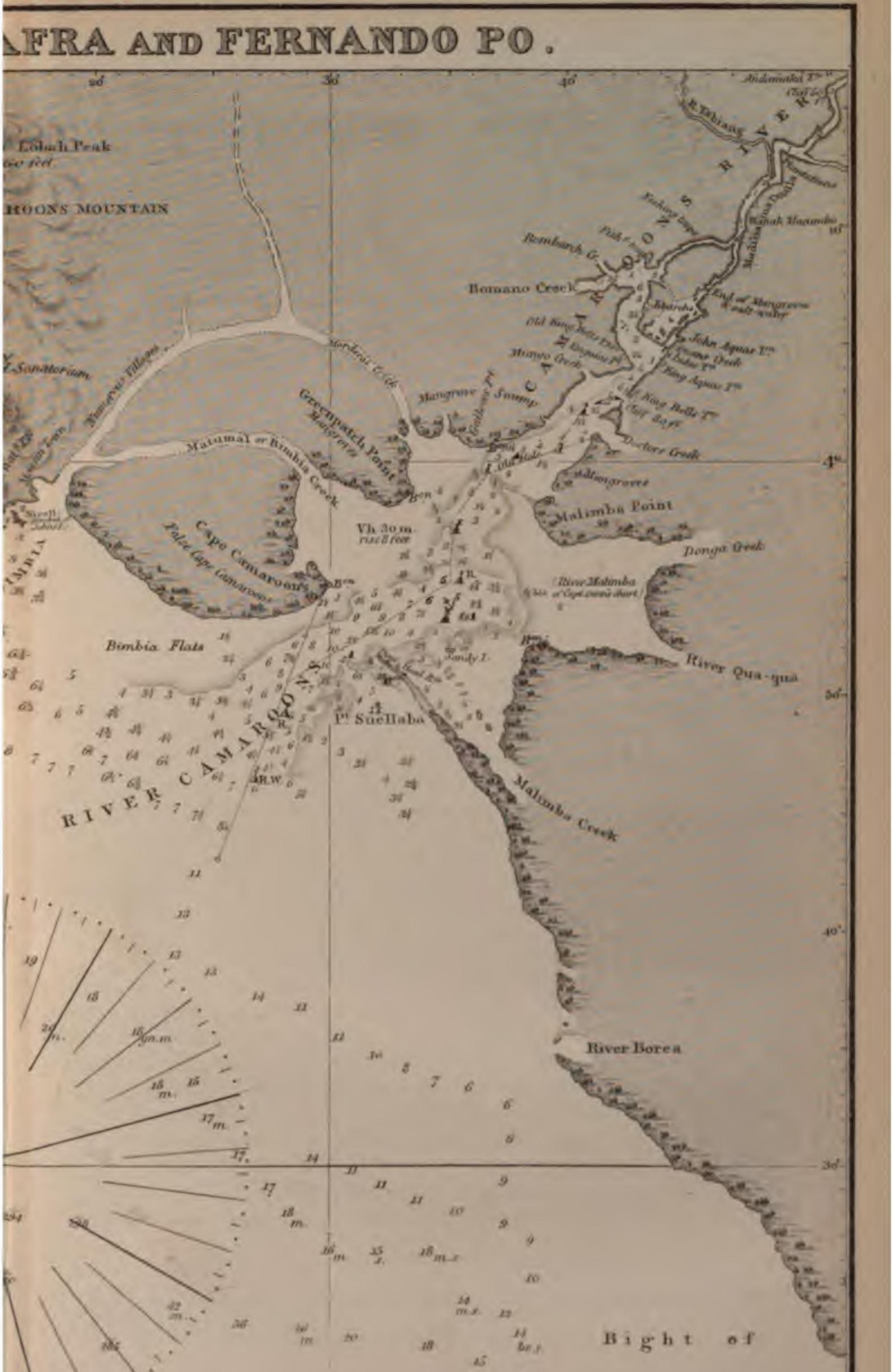

ET STREET, LONDON.

trees. Remarkable, also, is the variety of the scene, which is rarely beheld under the same aspect.*

According to Captain Allen, the native name for the highest part of the Cameroons or Camaroons Mountain is Mongo ma Lobah; but at the back, or inland, it is called Makoli ma Pako. The isolated peak near the Bay of Amboises, about 5,800 ft. high, is Mongo m'Etindeh. Although at a distance this noble mountain appears to rise by a continuous slope from the sea, on a closer view it is found to consist of a succession of hills, with intervening valleys of the richest soil, covered to within a third of the summit by beautiful forest trees, which are also seen fringing the ravines still nearer the summit. The remainder is clothed with grass, which becomes more scanty, as the colour, which approaches the reddish-brown of volcanic ashes near the cone, sufficiently indicates. The volcanic origin of the whole of this district is strongly marked by the scoriæ and numerous streams of lava which have reached the sea. From the present condition of its surface, it must have been for ages in a condition of repose, though there is reason to think it sometimes betrays its latent fires. In May, 1867, a stream of lava was observed flowing down the southern side of the mountain.

In clear weather, says Captain Owen, the stupendous highland scenery of the Camaroons Mountains gradually becomes unfolded to our view. The base of these mountains occupies a space of nearly 20 miles in diameter, the highest peak being 13,760 ft. above the level of the sea, covered with verdure and trees of luxuriant growth nearly to the summit; but one bare brown ridge, running from the eastern side toward the sea, at a short distance appears like lava. The Peak of Camaroons stands so boldly above the surrounding pinnacles, that the descent seems unbroken, giving to the whole the appearance of one vast mountain rising from a single base. The more distant Rumby Range, on the contrary, was seen towering in rude and rugged masses like the tombstones of a past earthquake; their greatest height must also be considerable, as we perceived them when more than 60 miles distant. The most lofty of these ranges is 44 miles N.N.E. of the Peak of Camaroons, the intervening space being a plain, with several conical hills rising abruptly from its surface, giving to the scene a novel and extraordinary appearance. *Qua Mountain*, which is situated 64 miles North of Camaroons, is also a stupendous elevation, and was discerned by us from a distance of nearly 80 miles. Most of these are volcanoes, as well as the whole of Fernando Po, which is immediately opposite to this part of the main. The sea boundary of the Camaroons presents some singular evidences in support of this; amongst them may be mentioned two rocky cliffs at some distance apart, but which are connected by means of a gallery, perforated at equal distances by a line of holes answering the purpose of windows, resembling the work of an expert engineer in the excavation of a fort.

Capt. R. F. Burton, that most indefatigable and accomplished of travellers, when at Fernando Po, in 1861, visited and ascended this noble peak. He then formed a project of forming a sanitarium for these pestilential regions on its lofty slopes.

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* Abbeokuta and the Camaroons Mountains, an Exploration by Richard F. Burton, F.R.G.S., 1863, vol. ii., pp. 25, 26.

A sanitarium is sorely wanted for this portion of Africa. During the present year, (1861), Lagos became a British colony, with the usual amount of civil and military establishments. The only escape from the deadly malaria is to Tenerife or Ascension; the former distant, under the most favourable circumstances, three weeks; the latter ten days of steam by the aid of an accidental cruizer. On the other hand, the Camaroons are distant barely fifty-five hours. Its area is little less than the inhabited portion of the Neilgherry Hills in Western India. It has every range of climate—a tierra, *caliente*, *temprada*, *fria*. The negro can flourish in the lower, the white man can sojourn in the upper part, where within 4° of the Line nightly frosts prevail throughout the year, and stores of ice and snow can be collected. The country is scantily inhabited, and only in parts by a timid and feeble, though a wild and treacherous people. Land may be bought for a nominal sum; and the soil, as this narrative will show, is everywhere fitted for cultivation. With less than the Spaniards have expended upon Fernando Po, or than that which we have lavished on the splendid but useless Zambesi River, these mountains might in a few years be made a solid benefit to the coast of Western Intertropical Africa. I have seen the marvellous effects of removing naval invalids from their ships to a few hundred feet above sea-level at Fernando Po; here, by judicious management, even greater benefits might be expected. And for the future we must provide against another and even a greater evil of climate:– the vomito, or yellow fever, which, of late years, was confined to the lands about the Gambia and Sierra Leone, is, whilst I write, advancing with giant steps towards the Equator. Its extreme elevation is known to be 2,500 ft.

The second volume of Capt. Burton's narrative contains a very interesting account of his ascent of the great peak, in December, 1861, the first time that ever man had been there, in company with Mr. Saker, the missionary at Victoria, and Mr. Mann, the government botanist. A peak near its lofty summit was named *Isabel Peak*, after Mrs. Burton, and the southern summit of the peak itself was called Mount Albert, and the northern one Victoria Mountain.

Victoria Mountain now proved to be the shell of a huge "double crater," opening to the south-eastward, where a tremendous torrent of fire had broken down the weaker wall. The whole interior and its accessible breach now lay before me, plunging sheer in vertical cliff. The depth of the bowl may be 250 ft.; the total diameter of the two, which are separated by a rough partition of lava, 1,000 ft. The interior slope is a highly-irregular cliff, which drops horizontally, streaked and ribboned with igneous matter, red and yellow, whose bands of colour indicate horizontal stratification, and comminuted scoriæ standing at an angle of 45°. Not a blade of grass, not a thread of moss breaks the gloom of the Plutonic pit, which is as black as Erebus, except where the fire has painted it red and yellow. To the N.W. appeared a ridge overtopping the rest of the two-headed cone which we had called Albert Mountain, and a bluff wall or dyke, which I had not time to visit.

To record my claim, I heaped up a small cairn of stones, and in it placed a fragment from the facetious pages of Mr. Punch, perhaps the greatest traveller on record, and certainly one of the traveller's best friends.

In the Proceedings of the Royal Geographical Society, April, 1879, is an interesting account of a journey made by the Rev. T. J. Comber inland from Mount Camaroons. He found the country at the base of the mountain to be covered with magnificent forest, including African oak, teak, ebony, and the cotton tree.

Coast.—From Backasey Point to the S.E., or toward the high land of Camaroons, you will pass over a slimy, muddy ground, and have 3½, 4, 5, and 6 fathoms, at 4 miles from shore. But on advancing toward the S.W. point of Camaroons, in lat. 4° 6′, the water deepens, and the coast becomes bold; and here, at 2 miles from shore, there is 10, 12, 14, and 18 fathoms. From the point the coast continues bold for 19 miles, to the point and village of *Bimbia*, called by the natives *Esoubou ;* and at a short distance from it the depths are 10 and 12 fathoms.

All the country from the estuary of the *Rio del Rey* to the *River Bimbia*, which is 48 miles to the S.S.E., is thickly covered with trees; and southeastward, from the S.W. point of Camaroons, it is generally bold-to. At 2½ miles to the southward of Cape Bimbia is an insulated sunken rock, between which and the coast there is 3½ and 4 fathoms. It is also reported to be nearly 3½ miles to S. by W. This rock requires caution, especially in those bound to *Camaroons River*, the mouth of which is 12 miles more to the eastward, and the intermediate soundings, 3, 3½, 4, 5, and 6 fathoms, the latter depth being in the mouth of the river.

AMBAS BAY, or the *Bay of Amboises*, at the southern base of the Camaroons Mountains, contains the settlement of *Victoria*, founded in 1858.

In May of that year the Spanish Government suddenly resumed possession of Fernando Po, after it had been virtually occupied by the British for nearly half a century. The Spanish Government immediately issued a mandate forbidding any but Roman Catholic Schools, and ordering those who preferred any religion which is not Roman Catholic, to confine their worship within their own private houses and families.

This announcement spread dismay among the Baptist converts, about 800 in number, at Clarence Town, and who had been settled here since 1827, and in consequence the Rev. Mr. Saker, the Baptist Missionary, his good wife and family, went over to Ambas Bay, and purchased from the natives about 12 miles of the coast at its head, and founded this settlement of Victoria with many of his flock. His iron-framed house, still standing, was the first erection. Good water, and abundance of vegetables, yams, and pumpkins, can be procured here. In Capt. Burton's " Abbeokuta and the Camaroons Mountains," he describes this bay, and its relation to his proposed sanitarium on the slopes of the mountain.

The bay was surveyed by Captain William Allen, R.N., in 1842, and the following is his description:—

" There are in the Bay of Amboises three small islands, the sizes and capabilities of which are in inverse ratio to their population. The largest, *Mondori*, or *Mondoleh*, only half a mile long, situated at the S.E. part of the bay is 200 feet high, and rocky, but with a level surface of the richest soil imaginable, of decomposed basalt, and the steep sides are clothed with beautiful wood. There are, at present, only ten men with their wives and families on it, though, if well cultivated, it would afford subsistence for probably five times as many.

There are three or four springs of water halfway up the side of the island, which, though scanty, are said to be always flowing. The landing is bad, but might be improved.*

"The outer island, *Ndami*, *Damĕh*, or *Ambas*, is smaller, and nearly barren; the rocky slopes and summits only are clothed with a little brushwood and grass. It is, in fact, a narrow ridge of rock, elevated at the outer extremity; but although nature has here provided no means of subsistence, about 300 or 400 people have made it their home. They exchange the abundant produce of the sea with the natives of the mainland for plantains and yams. They have also a good stock of goats and pigs, which feed on the precipitous sides of the island. Near the North extreme is the only place at which boats can land, but it is difficult, on account of the rugged rocks and incessant swell. With very little trouble, however, a good pier might be made. There is only one scanty spring, which, indeed, was dry when I saw it, unless I was misled; the inhabitants are, therefore, obliged to catch rain water, and in the dry season they must get supplies from the mainland.

"The *Island Bobia*, or *Bubya*, called also *Pirate Isle*, from the *supposed* predatory disposition of the natives, is more barren even than Daméh, from which it is distant 1¾ mile N.E. ½ N. It is a mere wreck of a larger island, as the numerous isolated fragments, perforated by the sea, and lying in its vicinity, bear witness of its having been formerly much more extensive. Rocks extend half a mile S.W. from the island.

"It is probable that it once joined the adjacent perpendicular cliff on the mainland, as the structure is similar, and between them there is but a narrow and shallow channel. The promontory may even have extended to Daméh, with which it is in a line. The progress of destruction is still going on, as enormous fragments of rock are lying at the North end of the island, which I believe to have fallen since my first visit in 1833. Although this is much smaller than the other two islands, it is swarming with people, almost every available spot on its rugged sides being occupied by a hut. It is perpendicular on all its sides, and the only access to the summit is by clambering up what appears to be the projection of a basaltic dyke, a fearful path, passable for only one at a time, and which might be defended by a child. The inhabitants probably owe to their impregnable position the bad character they have among their neighbours. They are a ferocious-looking, though a shy race; but I never heard of any well-authenticated charge of piracy against them. More correctly speaking, their secure position has probably engendered a spirit of independence, and a determination to resist oppression. The chief of Bimbia complained to me that they would not acknowledge his authority, nor comply with demands which I found were not so just as he alleged. These islanders are the principal fishermen of the bay, which in fine weather they cover with their light canoes. This enables them to barter from the main land, with which they are in constant communication, the scanty clothing they require, and supplies of plantains, yams, &c.

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* Separated from Ndami by a channel 1½ mile broad, stands Mondori, which Captain Allen calls Mondoleh, and others Mondoli, a much more interesting place. About 2 miles distant from the northern shore, it is separated from the bold headland forming the eastern arm of the bay by a fair broad channel. The Victorians declare that it is accessible while the sauciest sea runs outside, and that, when the rest of the bay is a sheet of foam, vessels can ride snugly under the lee of its northern point; they assert that it has an excellent holding bottom of dark tough clay, and that it is superior in many points to the celebrated Clarence Cove, Fernando Po.—*Captain Burton.*

"The anchorage is excellent in all parts of the bay, as to holding ground and depth (6 or 7 fathoms); and although it is a lee shore, and there is an incessant swell, I believe it never blows home here so as to endanger ships, and the landing is not so bad as at Ascension. The prevalent wind is S.W., to which the bay is quite open; and the worst months are, I believe, July and August, but there is shelter behind the Island Mondoleh. Wood, vegetables, and live stock may be had in abundance. Excellent water can also be had near *Kieh* (a mile westward of Victoria), but only at low tide, as the water gushes out at the foot of a rock. By excavating, however, above high water mark, a very convenient watering place might be made. The disadvantage of being on a lee shore is amply compensated by the purity of the sea breeze which blows across the Atlantic. The adjacent main land, too, is nearly devoid of mangroves and swamps; and as the land wind blows over lofty mountains, it is rendered cool and refreshing. Indeed, from the peculiarity of its situation, and from local circumstances, I think that the Bay of Amboises will be found to be the most healthy position on the coast of Africa. Although my visits were during part of the rainy season, we seldom had more than a shower, or a tornado, about once in 24 hours. The rest of the day the weather was very beautiful, and we were some days without rain."

It is high water, on full and change, in Ambas Bay, at $5^h\ 15^m$; springs rise 17 ft. When H.M.S. *Swallow* was here in 1877, yams were plentiful, but other supplies were scarce.

The RIVER BIMBIA was formerly called the *Rio Pequeno*, or *Little Camaroons River*. It may be easily known by *Nicoll Islet* without the entrance, on the western side, which is about a mile in length North and South, and lies at half a mile from the nearest shore. There is anchorage on its N.W. side, in 16 ft. of water, opposite a village (King William Town) on the main. The watering place is on the West side of a small cove, at little more than a mile to the N.E. of the anchorage.

At Bimbia there are numerous villages built on a beautiful amphitheatre of rocky ground: the inlet is sheltered by a small island, and would be an excellent anchorage for ships trading in palm oil; but it is very hot, and the land winds blow over the swamps of the estuary. The inhabitants are actively engaged in collecting palm oil. They, as well as the natives of the islands in the bay, are of the Dualla nation; while those of the base of the mountain are of a different race, and are called by their more civilised neighbours "bushmen."

The bar of the River Bimbia, which is 2 miles broad, extends to the S.E. of the islet, and has, on its shoalest part, 13 or 14 ft. of water, but within it deepens to 4 and 7 fathoms.

After leaving the Camaroons, the *Barracouta* proceeded round to the Bimbia, where she was visited by two canoes, one of which was capable of holding above fifty people, but which had not then more than thirty-three, who presented a singular appearance from the swiftness with which they plied their paddles, and the exact time they kept, resembling more a piece of mechanism than the united efforts of man. These canoes should never be allowed to approach a merchant vessel when not well prepared for an attack, as two instances of their successful treachery are on record, in one of which they plundered and destroyed an English sloop, together with her crew; and in another, where they contented themselves by taking everything that was valuable, and ill-treating the men. They also attempted to cut out an English brig; but the master, Mr. Town, being aware of their intention, quickly obliged them to retreat, with the loss of four killed.

The chiefs, or, as they term themselves, "gentlemen," who visited the *Barracouta* in their canoes, were distinguishable at some distance by the elevated chair on which they sat, with an umbrella borne over their heads. They had mistaken the sloop for a merchant vessel, and were much chagrined when they found themselves in error.

From the River Bimbia to the extremity of Cape Camaroons, the coast forms a convex sweep of 12 miles, in a S.E. direction. It is all low and covered with trees. *Point Suellaba*, the South point of the entrance of Camaroons River, is of the same description. The bearing and distance of the two points from each other are S. by E. ¾ E., and N. by W. ¾ W., 7 miles; but shoal grounds extend from the South halfway over the entrance, and the channel is in toward the northern shore.

CAMAROONS RIVER.—The fine estuary of the Camaroons is the common receptacle of several streams. It owes its name to the Portuguese, who called the extreme point Cape Camaroons, from the vast quantities of small shrimps (*camarao*) found there. This name has been extended to the principal river which falls into it; but the natives, as is usually the case, give it the name of the countries through which it flows. Thus, at Bell's Town it is called *Madiba ma Dualla*. Higher up it is *Madiba ma Wuri*, &c. Although it is a beautiful river, it is not to be compared with the Niger. Its average breadth above the mangroves is about 400 yards, as far as Captain Allen reached. In the dry season this portion of the river varies in depth from 2 to 20 ft., though they had rarely more than 8 ft.; but when flooded, there would be water enough for vessels of any draught. From the accounts, however, of several intelligent natives, the navigation is obstructed by rocks at Banem, about 50 miles from the furthest point which was reached, or 90 miles from the sea; but beyond these rocks the river goes on for many days, according to the pilot, though he could give no further account of it.

Captain Allen continues:—"In the months of May and June, 1842, while waiting with H.M. steam-vessels *Wilberforce* and *Soudan*, under my command, I took advantage of the delay to examine this part of the coast of Africa. I directed my attention first to the large estuary of the Camaroons. It had been partly surveyed by Captain Vidal; but some large rivers, which were supposed to discharge their waters into it, particularly the Malimba, remained unexplored.

"The settlements are situated on a plain, which, being elevated at least 50 ft. above the river, and being of a sandy nature, may be considered as comparatively healthy, an inference corroborated by the appearance of the natives, and the account of Mr. Lilley, agent to Messrs. Hamilton and Jackson, who resided there nearly ten years. A considerable trade has been carried on for many years with the settlers, who from their activity in collecting palm oil, and their intercourse with Europeans, have become a very large and important community, possessing such a degree of civilization as to render them highly interesting, and to prepare them for becoming a connecting link between the civilized Europeans and the less advanced natives of the interior.

"The towns of *King Bell* and *King Aqua*, separated only by a little brook, are of great extent inland. The houses are neatly built of bamboo, in wide and regular streets.

"Notwithstanding the constant intercourse kept up with the tribes of the interior, who bring down palm oil in their canoes, the nature and even the names of the rivers which furnish the means of transport for this valuable article have hitherto remained unknown. I endeavoured to obtain information from the chiefs and most intelligent men, but found their account so vague and unsatisfactory, that I was resolved on penetrating as far as I could without risking, what was of paramount importance, the health of my crew."

Accordingly Captain Allen, on May 7th, 1842, proceeded in a galley to explore the river, having found that it would be hazardous to take the *Wilberforce*, on account of the shoal parts of the river. Having advanced to beyond the salt water, the aspect of the banks began to change; the mangrove giving place to the first trees, which, as on the Lower Niger, were low palms with immense arching leaves or branches (called, erroneously, bamboo), from which the natives extract the best palm wine, called Nimba. On leaving the narrow channel, and passing the upper end of the Jibareh Creek, they attained the principal object of their little voyage, the main undivided river, a broad and magnificent stream, resembling some of the reaches of the Niger, below Aboh, and about 400 or 500 yards wide. As they advanced, villages became numerous, and all had a comfortable appearance, being built in the neat style of the Camaroons towns. As most of the principal natives were in the habit of trading with the ships, they frequently recognized Mr. Lilley, and the inquiries they made dispelled the idea that they were going among an uncivilized people.

They proceeded to about 40 miles from the sea, when they were deterred from advancing from fear of the effects of the fogs and vapours of the river. "The object I had in view was attained, viz., to ascertain the nature and magnitude of the river, by reaching the main undivided trunk, which is only 8 miles above Bell's Town, and less than 20 from the sea. Indeed, the real left bank of the river comes down as far as that settlement."*

According to Captain Owen's chart, from the inner extremity of Cape Camaroons, Greenpatch Point, on the East side of Matumal Creek, which leads to the River Bimbia, bears N.E. by E. ½ E., 4½ miles; Malimba Point, on the North side of Malimba River, E. ½ S., 9½ miles; and the South point of Malimba River, S.E. by E., 9½ miles. On entering, give Cape Camaroons a berth of 2 miles, and you will sail through the best water into the estuary of the two rivers, with Malimba Point bearing E. ¾ N., until a sandy islet, bearing S.W. by S. ¾ S., and Point Suellaba are in one, where you will have

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* "Excursion up the River Camaroons and to the Bay of Amboises, by Capt. W. Allen, R.N."—Journal of the Royal Geographical Society, 1843, p. 1.

4 and 5 fathoms of water in the stream of the two rivers, at 2 miles below a long spit of sand extending from Malimba Point, and 4½ miles below that point.

From this roadstead, Cape Camaroons will bear W. by N. ½ N., 5 miles; Greenpatch Point, between Bimbia Creek and Mordecai Creek, N. by W. ¾ W.; Gallows Point, on the North side of Camaroons River, N.E. by N. ½ N.; and Malimba Point, E. ¾ N.

From hence you may proceed up Camaroons River, by bringing the rugged trees on the East of Gallows Point to bear E.N.E., and run directly for them, which will lead over flats of 2½ fathoms, forming the bar of the Camaroons River. You run directly for these trees, until over the flats, which you will know by deepening your water to 3¼ and 3½ fathoms, in what is called *Old Hole.*

Enguias Point is 8 miles up the river beyond Gallows Point; and 3 miles below it, on the same side, is *Mungo Creek.* By bringing Enguias Point about two ships' lengths without the bushes at the water's edge, below Mungo Creek, you clear the middle grounds of the river, and advance within a musket shot of the North shore, at the rugged trees near Gallows Point.

Proceeding upward, about 2 miles above the rugged trees, steer more for mid-channel, keeping the gap up the river about a sail's breadth open; then you may run up to the road off King George's Town, on the South shore, only giving Doctor's Point (3 miles below it) a good berth. Here you may anchor in 5 fathoms. The tide, on the full and change, flows in the road at 6^{h}; at the cape, at 5^{h} 30^{m}; springs rise 7 feet.

A spit or flat of sand extends from every point of the river in the direction of the ebb tide, and more especially on the South side of the entrance, where the spit from *Suellaba Point* extends nearly 4 miles to the northward. Upon this spit is a chain of heavy breakers, called the *Dogs' Heads,* which may be seen at a great distance, and require a good berth, as the tide sets over them with rapidity.

Palm oil and ivory are equally abundant in this neighbourhood, especially the latter, which is large, and of very superior quality. To three large towns, *Mungo, Batimba,* and *Belimba,* the ivory of Camaroons is brought from the interior; and these, therefore, are the principal depôts whence the river is supplied. The system of barter is the bar trade, every article being valued at so many iron bars. Salt is an essential and important article of commerce, being in great demand.—*For other particulars, see Lieutenant Bold's Volume,* p. 84.

The slave trade formerly flourished here; in 1845 a treaty was made to stop this traffic, and succeeded effectually. A slaver entered the Camaroons River in 1860. Directly King Bell heard of it, he sent information to H.M. Consul at Fernando Po; a cruiser steamed across, and took the last slaver seen in the Camaroons.

The following directions are chiefly by Lieut. Langdon, R.N.:—"In entering the River Camaroons do not shoal the water to less than 6 fathoms until Cape Camaroons bears N.E. ½ E., when Greenpatch Point will be just open East of it. Keeping this bearing on, close the cape to about 3 miles, in 8 or 9 fathoms of water, then steer for Malimba Point on an E. ¾ N. bearing, taking care if the lead gives less than 4½ fathoms, and not a muddy bottom, to keep more to the southward. As soon as the islands in Malimba Creek open, bearing South, with Greenpatch Point, on the northern bank of the river, bearing N. ½ E., steer N.E. by N. for the rugged trees (a difficult mark for a stranger to distinguish) until Old Hole Point is in line with Hickory Point, bearing E. by N. ½ N.; run with these marks on to within half a mile of Rugged Tree Point, or until Doctor Point bears E. ½ S., then steer for Doctor Point until Hole Point Creek opens, when a N.E. by E. ½ E. course may be steered for Hickory Point, until Rugged Tree Point is nearly in line with Old Hole Point; this mark will clear the patch N.E. of Doctor Creek, and lead to the anchorage off King Bell's Town, where the vessel may come-to in 5 fathoms, mud.

"These channels should be buoyed for vessels drawing over 12 ft.; the bottom, however, is very soft, and would not damage a vessel on grounding. Mail steamers, drawing 18 ft., proceed as far as the town, where the channel is about 350 ft. wide. It is high water, full and change, at $5^h\ 15^m$; springs rise 7 ft., neaps 5 ft. The strength of the current at half tide is from 2 to 3 knots, and must be allowed for in the navigation of the river."

"The approach to the River Camaroons lies through a grand estuary, the entrance to which from the sea is dangerous; nor, once within the estuary, are dangers and difficulties at an end. A stranger would find himself in a very large expanse of water, bounded on every side by mangrove forests; he would see, at intervals, gaps in these, indicating rivers or large creeks, and would be at a loss to know which to steer for. A mistake, especially if the weather is not clear, may easily be made. I have more than once seen the mail steamers stick in the mud through errors of this kind.

"The towns are built on the verge of a sandy cliff, and being surrounded by, and interspersed with, cocoa palms, and plaintain trees, have a pleasing appearance. The ships lie within a short distance of the beach, and not far from one another. The staple produce is palm oil, of which 1,600 to 2,000 tons are bought annually; a ton or two of ivory may also be obtained in a year."—*W. Babington, Esq.*, 1874.

We subjoin a communication (June, 1838) from Captain Midgley, relative to this river:—

I send you the following directions for the Camaroons River, which were *partly* written by Captain John Lilley, of this town (Liverpool), with some corrections of my own. Captain Lilley's long experience and knowledge of the Camaroons River (having resided there some years) will, I think, entitle his directions to much confidence. I distinguish Captain Lilley's directions by inverted commas.

"From a berth of 3 miles off the N.E. end of Fernando Po, if there be no current, steer E. by S. ½ S. by compass, keeping Bimbia Point a little on the port bow, until the low and level land that extends from it to the S.E. is distinctly seen from the deck. When two-thirds the distance across, which will be in about 8 or 9 fathoms of water, keep the lead going, and do not approach this low land nearer than in 5½ fathoms" (to avoid the Bimbia Flats), "until the S.E. extremity of it, which is the *False Cape Camaroons*, bears N.E. by E., by compass, when a vessel must steer directly for it. The False Cape is 11 or 12 miles to the S.E. from Bimbia, and is the first part of the land of the river that should appear to a vessel coming from the westward. The False

Cape may be seen about 12 miles off in clear weather; and in steering toward it, upon a N.E. by E. bearing, there should never be less than 4½ and 5 fathoms of water, over a soft bottom, until nearly approaching the cape. When the vessel is about 1½ mile from False Cape, steer along the land into the mouth of the river, in about 5 fathoms; taking care not to go into less than 4½ fathoms, nor to more than 8 fathoms, until Cape Camaroons, which forms the western point of Bimbia Creek, is abeam of the vessel (bearing about N. by W.); whence steer toward Malimba Point, on about an E. by N. course, until Greenpatch Point (on the East side of Bimbia Creek) bears North, when you may safely anchor upon a muddy bottom, in 5 fathoms water, and send up a boat to Camaroons Town for a pilot.

" *Greenpàtch* is a round point, sloping gradually toward the water's edge at high water, and has low, smooth, verdant bushes upon it, from which the point derives its name.

" *On sailing from the False Cape to the Greenpatch*, should the lead give less than 4½ fathoms, haul well to the southward immediately, as there are several hard and shallow banks on the North side, which must be carefully avoided. (The North end of Fernando Po, kept well open of the False Cape, may be a good mark for avoiding them, but this mark I merely mention as an object for future investigation.) By keeping in the above depth of water, that is, in from 5 to 8 fathoms, a vessel will be out of all danger from the *Dogs' Head Reefs*, which extend nearly two-thirds of the distance across the mouth of the river, from Suellaba, and are always seen and heard at a great distance. The Dogs' Heads are steep, having 14 fathoms very close-to, and 10 fathoms within, at the distance of half a mile from them. On standing toward them, from the northward, the depth increases very rapidly from 9 fathoms; and they are extremely dangerous, as the ebb tide out of the Camaroons, Malimba, and Qua-Qua Rivers, and also out of Bimbia and Mordecai Creeks, which are branches of Bimbia River, combine together, and the stream rushes directly over them, with great velocity, at spring tides.

" As the bottom of the channel into the Camaroons River is all soft mud, should hard bottom be found, the vessel will be out of the fairway; and the depths from sea up to Greenpatch Point should never be less than 4½ fathoms, nor more than 8 fathoms, to ensure the safety of the vessel from the Dogs' Heads; and there should not be more than 6 fathoms until the true Cape Camaroons bears N.N.E. or N. by E. The False Cape must not be brought to northward of N.E. by E. until the vessel is about 1½ mile from it, as before stated; and with light winds frequent bearings should be taken, should the tides of flood or ebb have effect upon the vessel.

" It may not be superfluous to remark, that too much attention cannot be paid to the lead and lines when in or near this river, as the water shoalens and deepens in some places very suddenly, particularly between Cape Camaroons and the Dogs' Heads, or about S. by W. from that cape.

" In case a vessel is obliged to anchor off Cape Camaroons, she will find much less tide and easier riding in 5 or 6 fathoms than she would in deeper water.

" An instance having occurred of a vessel's boat going up the *Malimba River* (where there is no trade) instead of the Camaroons, it may be advisable, in sending from Greenpatch for a pilot, that the boat should keep the North

ard until she gets 6 or 7 miles above Mordecai Creek (which is the
k or bight on the North side of the river, and of which Greenpatch
tern point); then haul over to the South side of the river; and
be seen, if there are any in the river, at King Bell's Town,
e Doctor's Creek, on the South side of the river, and about
Greenpatch.

e at Greenpatch the Camaroons River does not appear
ut rather looms like a bay, with low land and de-
om of it; and a stranger may be easily deceived
precaution of keeping on the North side of the

at $5^h 30^m$, full and change, and rises above
n is fresh and fit for use, if filled from

ever are very prevalent diseases in this river,
much alleviated by keeping the vessel as dry as
fects have resulted from the unnecessary and very
of washing decks at night, in this as well as other African
the rivers of Africa, but particularly in the Camaroons, ships
e a considerable stock of *quinine*.

essels intended for Camaroons should be well provided with good ground
ackling, and be well manned and armed; for the tides are uncommonly strong, and the natives are of a very warlike and turbulent disposition, and universally dishonest in all their dealings. Their kings or chiefs have no power over them; and in chicanery, low cunning, and treachery, they far surpass any other people on the coast of Africa."

The coast between the Camaroons and Corisco Bay, during five days' sail, appeared at a distance like one continued range of low banks, thickly covered with wood, and with only a few small creeks to break off the connection. It appeared to be well inhabited; but the villages are so buried amidst the trees, that it is with difficulty they can be discovered. Many canoes came off, as the *Barracouta* ran along, bringing quantities of fish, fruit, vegetables, &c.; and although the ship was going about 6 knots an hour, yet they contrived to keep up with it for a considerable distance. These canoes are not more than 12 ft. in length, by about 2 ft. in width, and are built sufficiently light to allow a person to take one on his back when no longer required upon the water. The natives are extremely dexterous in their management; and although using but one paddle, propel them with great velocity. When they wish to lessen their speed, they throw a leg out on each side, and stop almost immediately.

BIGHT of PANAVIA.—From *Point Suellaba*, on the South side of the entrance of the River Camaroons, the coast takes a general trend of S. ¼ E. for a distance of 54 miles, as far as the bottom of Panavia Bight. Many forests of palm trees cover the high land. The soundings, at 3 miles from shore, are generally 5 and 5½ fathoms, mud, fit for anchorage. In the bottom of the bight you can safely anchor near the shore, in 4 or 5 fathoms, muddy ground; in its S.E. part is an excellent watering place.

River Borno falls into the sea about 12 miles from Suellaba Point, in lat. 3° 38′ N., and is supposed to be a branch of the large River Borea, a few miles to the southward. The entrance, though barred by a bank of sand, with 6 ft. water, is generally practicable, and as the people seem disposed to trade in palm oil and ivory, the place is gradually becoming of importance as a trading station. The anchorage along this coast is secure, as the tornadoes blow off shore.

The land at the mouth of the *River Borea* forms a projecting point, 16 miles South of Suellaba Point, but the entrance is only practicable for boats; for not only is the channel blocked by the small wooded Island of Branca, but off its mouth, a mile distant, lies a bank having only from 7 to 9 ft. of water, whilst the 3-fathoms line extends 2 miles off shore. The village of Borea lies about a mile from the North point of the entrance. From hence to *Garajam Point*, at the South end of Panavia Bight, the distance is 40 miles S. by E., and three villages are situated on the coast.

From Point Garajam, which is low and wooded, with some rocks which break at a mile off it, the coast trends S.W. by S. for 40 miles to Cape Campo. Inland there are many remarkable hills, one of which, *Elephant Mountain*, 12 miles South of Garajam Point, is described hereafter. For a distance of 23 miles to the southward of Point Garajam, the coast has a fine beach without mangroves, but rocks extend off in many places to the distance of half a mile from the shore; it is desirable, therefore, to keep a good offing of about 2 miles, or in from 12 to 14 fathoms water. About 3 miles southward of Garajam Point a river falls into the sea, over the cliff.

Batanga.—The country South of the Bight of Panavia is called the Batanga territory, but Mr. Consul Hutchinson says:—There are two Batanga territories. Little Batanga, the most northern and western, is with a river of that name, included in the greater part of the territory enclosed within the Bight of Panavia. Big Batanga comprises the territory on the West, extending from Cape Garajam to the River Campo, a distance of about 40 miles. Both of these districts are inhabited by the Bapooka and Banaka tribes. Batanga yields about 40 tons of ivory a year; and viewed from the sea the cataract of the Lobei River, in lat. 2° 56′ N., has an extremely picturesque aspect, falling in three different streams.

Great Batonga Bay, lat. 2° 52′ N., 8 miles southward of Cape Garajam, is a mere roadstead. It was visited by Captain R. F. Burton in September, 1862, in H.M.S. *Bloodhound*. The *Bloodhound* anchored 1½ mile off the land, in 5 fathoms water, lat. 2° 52′ N., and long. 9° 52′ E. At times a heavy surf breaks upon the whole of the lee shore, from Camaroons River to Corisco Island; the landing is execrable, and many lives and canoes are lost. There is, however, no difficulty in making Batonga Bay. At some distance, say 10 miles, it appears as a large headland, bounded North and South by the sea, and the small cascade of the Eloke, or Great Batonga River, offers a conspicuous landmark. When nearer, four tall cotton trees (*Bombax*), looking like gigantic palms, decorate the site of the sheds, representing the only European factories,—those of Messrs. Laughland and Messrs. Burford and Townsend. The aspect of the coast is by no means unpleasant. The country known to us by the names of Batonga or Banoko—properly the names of important tribes—begins at the South shore of the innermost recess of the Bight of Biafra, and extends southward to Cape St. John, which, in this direction, is the limit of the Consulate of Biafra. It is a long band of densely-wooded low land, based upon a yellow line of sand, broken in places, which appear to be the mouths of small rivers. Here and there fields of a lighter green give evidence of plantations; and the clusters of brown huts prove it to be not deficient in population.

The Elephant Mountain, about 7 miles inland, is the most remarkable of the hills hereabout. This mountain is clearly distinguishable from the roadstead, bearing S.E., and distant apparently 10 miles. Curious to say, there is a similar formation on the East African coast, with no great difference of latitude. At a distance the resemblance to an elephant *couchant* is striking. When the clouds clear away, a long chine extends high above the lowlands; sundry depressions form the ear and neck; a swelling on the right of the profile, dipping towards the southern base, is the trunk; and the body everywhere bristles with trees. In 1862 it was ascended for the first time by Europeans, by Captain R. F. Burton, then Consul at Fernando Po, and Lieut. Stokes, commanding H.M.S. *Bloodhound*, who found its elevation to have been correctly given as 1,707 ft.*

At about 8 miles E. ½ N. from Elephant Mountain is a high, isolated, conical hill, known as *Mount Nisus*, which, though belonging to a more distant range than Elephant Mountain, may be easily identified from seaward. The range, of which Elephant Mountain forms the northern part, follows the line of coast in about a S.W. by S. direction for a distance of 17 miles, preserving a distance of about 7 miles from the shore. *Les Mamelles* are two hills of equal elevation in the above range, about 8 miles distant from Elephant Mountain, and derive their name from their peculiar formation.

Mount Alouette, within Point Campo, 3,415 ft. high, may be termed the southern shoulder of the range alluded to above. When seen from a distance of 18 miles to seaward, it appears to rise with a gentle incline to its summit, whence after making a decided undulation to the southward, it falls with a steep descent to the lower lands which extend as far as the River Campo.

The Banaka or Banoko people occupy a district 25 miles in length halfway between the Camaroons River and Corisco Bay. It is only of late years that they have descended from the interior mountains, but they are now the most noted canoemen on the whole coast, using a singularly light and small canoe, not more than 8 or 10 lbs. in weight, as well as a larger one for more distant voyages.—*Rev. J. L. Wilson.*

These villages were first noticed by M. Bouet-Willaumez, the French Governor of Senegal, who despatched Lieut. de Kerhallet to examine them. The subject of his report is as follows:—At 8 miles North of the Rio Campo there is a point, remarkable only by two hillocks standing opposite each other. Still farther North are two more sandy bays, the rocky points which divide them having the sea washing their bases. At the head of these points begins the roadstead or Bay of Banoko. This bay is not deep, and is easily known by the high lands around it.

The four or five villages of *Banoko*, which give name to the bay, are not seen, even from the anchorage. In coming to this bay, bring the Alouette

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* For an account of this ascent, see "Journal of the Royal Geographical Society," vol. xxxiii., pp. 241—250.

Mount to bear E.S.E., and approach as near as the breeze will allow you, and anchor in 5 or 6 fathoms. The villages are extensive. There is a remarkable small pyramid of rock on the coast, in about lat. 2° 37′ N.

The River Campo is known by two mountains to the eastward of it, about 25 miles inland, and named, after their shape, *Saddle Hill* and *Table Hill*; the latter is the southernmost. Off the South point of the river lies a shallow stone bank, that appears at low water, and on which the sea breaks with great violence. Its entrance is about a mile broad, and its bar allows vessels of moderate draught to go in. Ivory is the principal article of trade here. *Bird Rocks*, 18 ft. high, which appear as a whitish islet off the coast in lat. 2° 11½′, are a good landmark for this port.

At 20 miles southward of the River Campo lies the small Bight or Cove of *Bata*, wherein there is good anchoring ground in 6, 5, and 4 fathoms: as also good ballast and fresh water, but caution is necessary, as the soundings are very irregular. A few houses, close to the water side, at *Otondo River*, are scattered along the shore, which is very low and woody, and its strand is seen at low water. From hence you descry the Seven Hills, lying in a row N.E. and S.W., about 15 miles inland. The middle one, a sharp peak, is the highest (2,786 ft.); and they have nothing remarkable but their ill shape. Valuable ivory is said to be the principal article of export from the Otondo River.

River San Bento lies 47 miles S.W. by S. ¼ S. from the River Campo, and is noted for its trade in ivory. It has 3 or 4 fathoms in the narrow navigable channel, but the entrance, which is 6 cables broad, is barred by several shoal heads of 5 ft. The North point is remarkable by a hill, called the *Heybern*, with a large village at its foot.

From *Joho Point*, the South point of entrance, a sandy spit extends 1⅓ mile to the N.W., and has on its outer extreme only 2 to 6 ft. water; between this extreme and the northern shore are several shoal heads of 5 ft., almost barring the approach to the entrance, but by keeping Outer Point in line with Green Point (both on the North side of the river) S.E. ¼ S., a vessel will carry not less than 10 ft. at low water right up to the mouth of the river, where the depth is from 3 to 4 fathoms, which depth is preserved for a distance of 3 or 4 miles farther up. There is good anchorage about 3 miles off the river's mouth in 7 fathoms. At 4 or 5 miles up, the river divides into two branches, to the E.N.E. and E.S.E.

From South Point, about 2 miles W.S.W. from the entrance of this river, a reef extends along the coast, with some rocks above and under water, to the southward. This coast is all covered with trees; nor are you out of sight of it when in 18 and 20 fathoms of water.

CAPE ST. JOHN, in lat. 1° 9′ 40″ N., long. 9° 21′ 45″ E., is 30 miles S.W. ½ W. from the River San Bento. The coast between is irregular, rocky, and foul. At about 24 miles inland, between these places, is a mountain, 3,940 ft. high, which, from its form, is known by the name of *Mitre Hill*. Nearly on the parallel of this hill, and 9½ miles off shore, is a bank of 16 and 17 fathoms, 5 miles in extent, known as *Mitre Bank*. To the southward of the River San Bento, one half of the coast is low and woody; the other half, ending at Cape St. John, is rocky. In lat. 1° 27′ is the trading village of *Boquah*, which is not visible from the sea. The cape itself, surrounded with a ridge of rocks, has no beach; and extending more than 3 miles off its pitch is a small stony bank, with 7 or 8 fathoms water on it. The streams, meeting here with impetuosity, caused by the great unevenness of the ground, the water, which comes from the South, beats violently against the cape, and then runs swiftly along to the northward. Mirage is frequent hereabout.

On a track survey of this coast, in the pinnace of the *Barracouta*, the country appeared beautifully picturesque, presenting a most pleasing diversity of hill and vale; but the natives gave demonstrations of determined hostility, and it was found prudent not to allow them to approach in any numbers, and also at night to lie at a convenient and safe distance from the land.

Several dangerous rocks have been found near St. John's Cape. In 1842, H.M.S. *Diligent* struck in about 8 ft. water, when 3 or 4 miles N. 30° W. from Cape St. John. In 1865, H.M.S. *Espoir* grounded in 11 ft. water, N. by E. ¼ E. 4 miles from Cape St. John, and 2 miles N.W. of a small green island, called *Boenja Island;* this spot lies on the western extremity of a bank extending from the island. There are probably other dangers off the coast, lying between Camaroons and Corisco Bay, necessitating caution when navigating in this part.

From Cape St. John the coast trends S. by E. ½ E. 4½ miles, to the N.W. point of Corisco Bay, forming two slender sandy coves, divided by a rocky headland, toward which are regular soundings. *Seagull Rock*, nearly 1¼ mile West, northerly, from the N.W. point, dries at low water; the S.S. *Macgregor Laird* was wrecked on it, in November, 1871. Vessels must not attempt to pass between it and the shore.

Interior to St. John's Point, and abutting into Corisco Bay, is another point, called *Malonga;* between these two points is a small river running from the base of Mitre Hill. There is here a line of quartz rock, exactly like that containing gold at the Australian diggings.—*Hutchinson.*

CORISCO BAY, between the N.W. point above mentioned, and *Cape Esterias*, to the S.W. by S. ¾ S., presents an extent of 28 miles. Nearly midway is *Corisco* (or Thunderbolt) *Island*, the North point of which is 14 miles S.W. by S. ½ S. from Cape St. John. The bay is much encumbered with the numerous banks, of which the chart will give the best description.

Only two of the islands in the bay, Corisco and Big Elobey, are inhabited, and the population of Corisco does not exceed 1,000. For many years an American mission, sent out by the Presbyterian Board of Foreign Missions, has been established here, whose chief, the Rev. James L. Mackay, reduced their language to writing, and translated into it much of the gospel. The natives of Corisco are artificers of very large boats which they scoop in canoe fashion out of the single trunk of a tree.*

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* The island is not more than 12 miles in circumference. Its population, of about 1,000 souls, is scattered all over the island. They are a quiet, peaceable people, hospitable to strangers, and fond of white men, particularly of the missionaries who have settled among them. They belong to the Mbenga tribe, who are the most enterprising traders and the most daring boatmen of the coast. They were formerly the most warlike tribe of this part of the country, and were continually fighting with their neighbours. The Presbyterian

Even in this luxuriant land Corisco is distinguished by its beauty. It is a little world in miniature, with its miniature forests, miniature prairies, miniature mountains, miniature lakes, and miniature precipices on the sea-shore.*

Corisco, claimed by the Spaniards, is a part of the territory attached to Fernando Po.

The North part of the bay forms a semicircle, 12 miles in breadth, into the N.E. side of which falls a river, the *Muni*, from the N.E. The entrance of this river is a mile in breadth; and off it, at the distance of 4 or 5 miles, are two islets, called *Elobey Isles* (formerly *Mosquito*), having several rocks and shoals about them to the North, N.W., and South. From the N.W. point of Corisco Bay these islets bear S.E. by S. ½ S., 10½ miles; and from the N.E. end of Corisco Island, E. ½ S., 11 miles. Factories are established on the South end of the small isle.

"By bringing an easily-distinguished clump of trees on the N.W. point forming a crown in the N.W., and then steering S.E., a ship will never have less than 5 or 6 fathoms, sand and mud alternately, right into Eloby anchorage. With decreasing soundings and mud bottom, a ship is to the northward of this fairway channel, while with decreasing soundings and sand bottom she will be to the southward."—*C. Alexanderson, Esq., F.R.G.S.*, 1880.

From the River Muni the eastern coast of Corisco Bay trends S. by W. 22 miles, to the mouth of a larger river, the *Moondah*, which is 5 miles in breadth. The water along shore, between the two rivers, is shoal to the distance, in some parts, of 3 miles from shore. The general depths at the entrance of the Moondah are from 3 to 5 fathoms. From the western point of the Moondah to Cape Esterias the coast trends W. ¼ N. 11 miles.

The N.W. point of Corisco Island lies in lat. 0° 55′ 54″ N., long. 9° 19′ 45″ E. This isle is rather more than 3 miles in length North and South, and 2 miles in breadth, completely surrounded by a shallow bank. At a mile from its S.W. side is an islet named *Laval*, with a reef about it. *Laval Bank*, a dangerous reef, lies S. by W. 3½ miles from *Laval Islet*, off the S.W. point of Corisco Island. From the S.E. end of Corisco a narrow reef extends 2 miles to the eastward; and there is a shelf extending from the northern shore. The island is moderately high, but overgrown with high trees, which seem in places to stand in the water. The natives trade in ebony, dye-woods, and ivory. The tide flows here, on the full and change, at 5^h; the rise is 7 ft.

At 5¼ miles S. ¾ E. from the S.E. point of Corisco lies an islet, called *Baynya*, or *Little Corisco*, having several shoals, &c., about it; and a flat extends 6 miles from it to the W.S.W. In the channel between the latter and Cape Esterias the depths are 5 and 6 fathoms; but shoal water extends halfway over from the southern shore, and farther on is nearly blocked up.

The River Muni was formerly described under the name of *Rio da Angra*, or *St. John's River*. From the N.W. point of Corisco Bay its entrance bears

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Board of Missions having sent out some missionaries, the labours of these worthy gentlemen have almost entirely changed the character of the Mbenga. They are no longer so quarrelsome, and have lost that reputation for ferocity on which they formerly prided themselves.

* "Savage Africa," by W. Winwoode Reade, Esq., F.R.G.S., an interesting work, containing much information as to the native tribes, &c.

S.E. ¼ E. 13 miles. In the direct course between, the depths are from 6 to 5, 4½ to 3 fathoms; but more to the South are several shoal spots of 2 and 2½ fathoms, around Elobey Isles. From the same N.W. point the entrance of the River Moondah bears S. ¼ E. 28 miles. The least depth on the Bar of the Muni, at some distance without the river, is 18 ft. Within and without it is all soft ground, and variable but increasing depths.[*]

The banks off the entrance are continually shifting; during a partial examination in 1872-3, it was found that their depth and position had materially altered since the time of the survey by Capt. Owen in 1836. Vessels entering should obtain a pilot, or send the boats ahead sounding.

The natives of the Muni were reported as being unfriendly, and particularly inimical to Europeans; and as the inhabitants of all the islands gave them the same character, and will not even allow them to land, it may not be without foundation. While the *Barracouta* was employed about these islands, the the natives were continually coming on board; they were found very docile, and passably honest—a fortunate circumstance, as they supplied the vessel plentifully with every description of fresh stock and vegetables.

The River Moondah, which falls into the S.E. angle of Corisco Bay, is rather a salt water estuary, receiving the waters of several minor rivers, one or two of which are of importance. Its entrance between *Arandah Point*, on the West, and the East coast, is about 5 miles wide, but the navigable channel is narrowed to 2 miles by the shoal water on either side. A mud flat dries some distance off Arandah Point at low water. At 4 miles above Arandah Point is a small island, *Assimba*, which will become clear of the land as soon as you are well within Arandah Point. Soon afterwards you will make out the village of *Nembo*, opposite to Assimba, 3½ miles East of it, and remarkable by two large trees, with white trunks.

Assimba belongs to the Gaboon people, and large vessels can come up to it. The passage thither is somewhat difficult, on account of large mud and rocky banks which extend from Arandah Point, and contract the river. This island, with two other smaller wooded islets, lies in the mouth of the *N'cogwé River*, up which Lieut. Sewal ascended in the small French steamer *Pionnier*, in February, 1862, and found that it led to a portage of about 400 yards, over which the boats are drawn to the shores of the Gaboon at Kringer, North of the French settlement.

A bank, with 7 ft. at low water, soft mud, on which the French vessel of war *Le Boursaint* grounded in 1879, lies on the western side of the entrance to Moondah River, with the following bearings:—North Moondah Islet (on which are two conspicuous trees), S. 49° W.; East extreme of Great Moondah, S. 31° W.; and Arandah Point, N. 25° W. At 2 miles eastward of Moondah

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[*] The *Muni* is said to have been much frequented by the Portuguese for ivory, ebony, bar wood, and pod pepper, obtainable at a moderate rate, for common cloths, iron-ware, tobacco, rum, beads, &c. By coming to an anchor off Corisco, a ship may load with bar wood, in a few days; but to procure ivory, it is requisite to proceed to the town of Angra, about 8 miles up the river, on the North shore, taking every precaution against treachery on the part of the natives. Off the town is anchorage in 5 fathoms, sand and gravel. The river has been described as navigable 10 or 12 miles farther up to the N.E., and then contracting into a very narrow channel. The name of Muni signifies *Beware!*

Islets, and nearly in the centre of the river, lies a bank of soft mud, which dries at low water.

The other streams are the *Anambo*, to the southward, and the *Cohi* from the S.E. This was ascended by the French vessel *l'Arabe*, in 1861. The river *Djiemboé*, also from the S.E., was explored in the steamer *Pionnier*, by Lieut. Sewal, in 1862, for 20 miles from its entrance. These streams, also, run close to others which enter the Gaboon.

Corisco Bay is described as follows, in the Narrative of the Expedition under Capt. Owen:—This place derives its name from the Portuguese, being imparted from the constant thunderstorms by which it is visited. The bay is 32 miles, North and South, from Cape St. John to Cape Esterias, and 15 miles from the islets which are situated off the entrance of the River Moondah. The surrounding shores are thickly clothed with verdure; the numerous islets with which it is studded being also green to the water's edge.

The people here, particularly the females, are a very degraded race; but in 1826, shortly after the arrival of the *Barracouta* off Great Corisco (the principal island), Jack Romando, a kinsman of their King Jem, and who in his early years had visited England, went on board, and produced various certificates highly creditable to his honesty and humanity. The inhabitants of the isles greatly resemble those of the Gaboon, a little to the southward, in manners and dress; but strange to say, their language is totally different.*

The towns situated on Cape St. John are under the dominion of the King of Corisco, but the other places around the bay are inhabited by *Bullamen*—a very wild and savage, but timid race.

The *Corisco Islands* are very fertile in appearance, and productive in reality; the largest, called *Great Corisco*, being about 3 miles long, by 2 miles broad. At the South end is a populous town, with a good anchorage, at 1½ mile from shore, in 7 fathoms of water. There are, however, several patches of rock in the neighbourhood, which, being lightly covered above, and surrounded by very deep water, renders them extremely dangerous, making it requisite for vessels to take every precaution when in their vicinity.

Cape Esterias, before noticed, lies, according to Captain Vidal, in lat. 0° 37′ 48″ N., long. 9° 21′ E. The shore about it is rocky and foul. From the cape to *Point Sta. Clara*, or *Joinville*, at the entrance of the River Gaboon, the coast trends S.S.W. 7½ miles. It is, in general, bold, and covered with trees; but about Point Sta. Clara (Joinville) the trees have been cleared away, and the land cultivated. Off Cape Joinville there are several sunken rocks, and on it is a conspicuous *beacon*, in shape a white triangular pyramid, 28 ft. high, surmounted by a cylinder 4 ft. high. At 1½ or 2 miles from shore there is 7, 6, and 5 fathoms.

RIVER GABOON.—The River Gaboon, or Gabun, was surveyed under the orders of M. le Comte Bouet-Willaumez, by Lieut. Fleuriot de Langle, in 1844, and M. C. Ploix, in 1849. The former French officer made an elaborate report on the hydrography of the river, or rather estuary. But there is one point which demands notice—that the names which have been applied in former years have been replaced by other and recent French names, in addition to applying similar appellations to points not previously named, which may cause some confusion in the nomenclature.

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* Captain Vidal has said that, along the West Coast of Africa, those natives who speak English are in the habit of using a number of words and phrases, often so strangely misapplied as to create much amusement. Among the most remarkable are "bob," for noise or threats: as "Suppose I tief dat man wife, bob come my side;"—"lib," or "live," for remain, or to express locality; as "Ship lib here two moons;" "Rock lib here:"—"chop," for eating; as, "Suppose you go long way among Bullaman, he chop (eat) you," &c. All officers under the rank of captain they term "mates."

The Gaboon was colonized by the French, on August 25th, 1843. Possession was taken by Capt. Monléon, in the brig *le Zébre*, accompanied by the gunboat *l'Eglantine*.

It is called *M'Pongo* by the natives, and is rather a broad estuary than a river. It penetrates the coast for 30 miles, with a breadth of 7 miles at *Coniquet*, or *Konikey Island*, 12 miles from its mouth.

At its head the two principal streams fall into it. The one from the East is the *Como*, or *Oulombo-Empolo*, which rises in the Sierra da Cristal in the interior, and is about 800 or 900 yards wide at its mouth, and can be readily ascended for 50 miles or more. It was explored in 1858—60 by Messieurs Dusmesuil and Braouezec, two young French officers. The other river is the *Rhamboé*, which has a course of about 40 miles from the S.E. Since then, other travellers have endeavoured to ascend these rivers to their sources, but unsuccessfully.

There is said to be communication from the River Moondah to the Gaboon by the *River Cohit*, which enters the latter opposite Konikey Island.

The French establishment is about 10 miles from Cape Joinville at the entrance of the Gaboon, on its N.E. side, and consists of two brick or stone buildings, one for the commandant and his officers, the other for an hospital; a mole, abreast the governor's house, renders landing easy. Numerous wooden barraooons serve as warehouses, and other buildings serve for a community of nuns, and a Catholic mission, with a bishop at its head. A block house, now abandoned, stands near the village of St. Louis, two-thirds of a mile from the establishment; it forms part of the garden of the Roman Catholic Mission, whose buildings are close to it. Near the establishment is the village of *Libreville*, inhabited by liberated slaves.

Magnificent forests surround the river, containing a large quantity of noble timber and dye-woods. Its chief trade is in ivory, bees-wax, caoutchouc, ebony, &c.; the mail steamers from Europe engross nearly all the carrying trade.

On November 1st, 1854, the French establishments here were separated from the Government of Senegal, and the Gaboon is now the centre of the administration, and a military and naval force is maintained. There are also some English and German factories here.

Fresh provisions, such as goats and poultry, may be obtained at the villages on the eastern shore; at Denis, on the western bank, bullocks are reared. Water is plentiful on both shores, but on the eastern side there are rivulets which run into the sea, whence supplies may be procured, but only at low water. The watering-place in Acquengo Bay, just within Cape Joinville, is the best in the Gaboon. The coal depôt is on the western shore, about a mile to the northward of the village of Denis; the French Government keep a large supply at the dockyard, and it can also generally be obtained from the merchants, The port of the Gaboon is superior as a safe harbour to almost all others on the West Coast, whilst in the Ogowe (to say nothing of other rivers) we have the most important stream between the Niger and the Congo, forming a direct and natural highway into the rich and interesting regions of the interior.—*R. B. N. Walker, Esq.*

The Gaboon is accessible to the largest ships, and affords commodious anchorage, and good shelter for a fleet, for although the numerous and extensive shoals, which obstruct the entrance, render the navigation somewhat difficult, they increase the security of the anchorage in the river.

The Gaboon derived its principal interest to the world at large, a few years ago, from the travels and adventures of M. P. B. Du Chaillu, who for several years resided with his father at the French settlement, the latter having a factory there. M. Du Chaillu's book, "Adventures in Equatorial Africa," in which he describes, for the first time, the habits, &c., of the gorilla, is one of the most interesting works in our language. It excited some controversy, but this was quite subverted by the intrepid traveller's second journey and narrative, "A Journey to Ashango Land," 1867, a sterling work of as great interest as his first.*

At two or three miles above the French station, and opposite to Pongara Point, is *Baraka.* It is thus described by M. Du Chaillu.

Baraka is the head station of the American Board of Foreign Missions on the Gaboon River, and, indeed, the only mission the board has as yet on the Western Coast. It was established in 1842 by the Rev. J. L. Wilson.

Baraka is a Mpongwe word, derived from *barracoon*, a slave factory or inclosure. Strangely enough, the very site whence now the Gospel is taught to these benighted Africans, and where their children are instructed in the knowledge and duties of Christianity and civilized life—this very place was once, and not many years ago, the site of a slave factory, where the cruel slave-trade was carried on with much energy and success.

Baraka is situated at the summit of a beautiful hill, distant a few hundred yards from the shore, and about 8 miles above the river's mouth. The native villages surround the base of the hill, and are scattered along the river bank, and are thus easily accessible to the missionaries, who visit them at all times, and preach to the natives several times a week.

The missionary grounds are spacious, and are surrounded with a noble hedge of fragrant lime-trees. The buildings are mostly of bamboo—which is the best building material on this part of the coast—and consist of two dwellings occupied by the missionary families; the church building, which has some fine shade-trees in front; the storehouse, the schoolhouse, a little building containing the missionary library, houses where the children attached to the mission are lodged; and, finally, the kitchen—kitchens being in the tropics necessarily separate from the dwellings—and the other necessary offices, among which figure fowl-houses, &c. Behind the houses is a fine orchard, containing various fruit-trees, all planted by the missionaries, as were also the fine cocoa-nut, mango, and other trees which are scattered about the premises, and beneath whose grateful shade the houses are built.

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* See also "Two Trips to Gorilla Land, &c.," by Capt. R. F. Burton, 2 vols., 1876, in which an account of a visit to the Gaboon, and the settlements to the southward, will be found.

In the Society of Arts Journal, 1876, pp. 585—597, is an interesting paper by R. B. N. Walker, Esq., on "The Commerce of the Gaboon; its history and future prospects."

M. Bouet-Willaumez speaks in high terms of the Gaboon, having passed entire months there without having to deal with the maladies so common in the Bonny. The vegetation he describes as magnificent, only to be compared to that of Guyana; wood of all kinds abounds, for building, dyeing, ebony, &c. Ivory, of fine quality, is also a great feature in the trade; cotton and other tropical products will doubtless form features in the future commerce, but it is difficult to induce the natives to work, when their wants are almost spontaneously supplied by the soil.

In 1843, as before stated, M. Bouet-Willaumez, as governor of the Senegal, was charged by the French Government to found on the right bank of the Gaboon an establishment for the trade, and for the refitting and refreshment of the ships employed in the French cruising squadron on the coast of Guinea. The primitive establishment, called *Fort Aumale*, was then constructed, and is the basis of the French possessions here, which have been gained by treaty or purchase from the natives at different periods.

Contiguous to Fort d'Aumale a very pretty garden was laid out by M. Bouet-Willaumez, but it is deteriorating. There is also a pretty little Père la Chaise Cemetery; and the bishop has a considerable quantity of land under cultivation. There is a breakwater at the pier, which is very useful. About half a dozen French merchants have stores in the neighbourhood of the French station. The establishments of the English merchants, four in number, are located higher up, in the neighbourhood of Glass Town.

The peninsula which separates the Gaboon from the River Moondah has been named *Louis Philippe Peninsula*. It is bold and on the highest hill, 656 ft., which has been named *Mount Bouet*, there is an enormous tree, now obscured by the forest. *Mount Baudin*, of about the same elevation, lies 2 miles to the southward. These characteristics form a good landmark, at about 12 miles distance, in approaching from seaward. The southern side of the entrance is called *Marie Amelie Peninsula*, and is low and flat; the distinction between the two sides of the river making an important difference in the landfall.

In the subsequent descriptions we have retained those names which have been applied in former times, and are those according with our English Admiralty Survey.

From Point Sta. Clara, or Joinville, *Pongara*, or *Sandy Point* (*Cape Montagniés*), on the South side of the river, bears S. ¾ W., 9 miles, and on it is a *beacon*. Here the sea is constantly bubbling and agitated, in consequence of the shoalness of the water and the bottom being very foul. At 4½ miles S.W. by W. ½ W. from Pongara Point is *Gombé*, or *Round Corner Point*, distinguished on each side by elevated land, which serves as marks for the river, and also has a *beacon* on it. Within 4 miles to the N.W. of Sandy Point, are several shoal spots, which render an approach on that side unsafe.

A trading town, called *King Qua Ben's Town*, stands on the eastern shore, facing the sea, at 8½ miles S.E. by S. from Point Sta. Clara; and another town, *King Glass Town*, stands on the same side, at 3½ miles S. by E. ½ E. from Qua Ben's Town, the village of Libreville lying midway between.

From King Glass Town to *Oweendo*, or *Red Point*, the coast trends S. by E., 6½ miles. Here the river forms a great bight to the south-eastward. At 2 miles to the S.E. of Red Point is a small island, called *Dambee, Coniquet*, or *Konikey;* and at 3 miles S.W. of this is a smaller, called *Embenee*, or *Parrot Island*, with 4½ to 8 fathoms in the channel between them. Vessels going beyond this should employ a local pilot. Southward of Pongara Point, on the West side of the river, there are several creeks, all fronted by shoals, making access difficult.

The entrance between Cape Sta. Clara, on the North, and Pongara (or Sandy) Point, on the South, is 9 miles wide; but several shoals, which require great caution, lie in this space.

Themis Bank, on which the French frigate *Themis* struck in 1877, lies in the approach to Penelope Pass, about 5½ miles W. by S. ½ S. from the white beacon on Cape Joinville. This shoal has a depth of 19 ft. at low water spring tides, and is about 100 yards in extent; within the depth of 4½ fathoms the greatest extent of the bank is about 330 yards in a N.E. and S.W. direction. A *black buoy*, marked No. 1, is moored about a mile W. by S. from the shoalest part of the bank, and should be passed on the port hand in entering the river. About 8 cables eastward of the position of Themis Bank an apparently isolated patch of 3 fathoms was also found.

On Pongara Point stands a *beacon*, 42 ft. high, consisting of the funnel of a steamboat, painted in black and white bands, and this stands out conspicuously on the sand, 340 yards southward from the extreme point. At 4½ miles N.W. from this beacon is the *Mouche Bank*, the outermost danger on the South side, having 9 ft. least water. It is nearly connected with Pongara Point by shoals, which are marked by *red* buoys. A *red* can buoy, with staff and flag, is moored about 1½ cable northward of its North extreme.

At 3½ miles N. ½ E. from the beacon is the *Caraibe Bank*, 9 ft., marked on its South side by a *black* conical buoy, with staff and ball, lying in 5½ fathoms, with Point Gombé, on which is a beacon (a white tower), bearing S.W., and Coniquet Hill, S.E. ¾ S. Between this shoal and Cape Sta. Clara is *Nisus Bank*, and *Recherché Bank*. At 2 miles E.S.E. of it is *Middle Bank*, 15 ft.; and at nearly 4 miles S.E. by S. from the Caraibe Bank buoy is a conical *black* buoy, with staff and ball, lying close off the S.W. end of the S.E. bank, and at 2 miles East of the beacon on Pongara Point, the channel, called the *Belle Paule*, or *Penelope Pass*, lying between. It has from 7 to 11 fathoms of water.

Two additional buoys have been moored on the South side of Penelope Pass, marking respectively West and Pongara Banks; these with the buoys marking Mouche and Butterfly Banks (all on the South side of the channel) are painted *red*. The buoys on the North side of the channel are painted *black*. Each buoy is conical, and marked with the colour of the buoy and the number in entering from seaward; even numbers on the *red* buoys, and odd numbers on the *black* buoys.—*Staff-Commander H. H. Hannay*, H.M.S. *Active*, 1876.

At 2 miles within Pongara Point, on the West side of the estuary, is the coal depôt.

Lights.—At Libreville two *fixed* harbour lights are shown. The northern light on the North pier is *red*, the southern light on the South pier is *green*. By keeping the three lights (forming a part of the lighting of the Plateau) in line, E. by N. ¼ N., the extremities of the piers and the rock in the entrance of the harbour will be avoided.

Directions.—Having first made Cape Santa Clara, which is bold and conspicuous, steer for Pongara Point, passing northward of the buoy on Mouche Bank; approaching Pongara Point, the funnel mentioned before will be readily distinguished, standing out on the sand like a tower. The mark for taking this channel is to bring the South point of Coniquet (or Konikey) Island open of Oweenda Point, bearing S.E. ½ S. When the beacon is seen, the buoys on the Caraibe and S.E. Banks will be recognised, both of which are to be left on the port hand on entering; having passed the latter *buoy* there are no more dangers, and you may steer for the anchorage, bearing in mind that the strength and direction of the current is considerable at full and change of the moon. No pilots are to be obtained off Gaboon River, neither do any appear necessary.

Good anchorage will be found along the right bank of the Gaboon, between Breton and French Points, in from 6 to 4 fathoms, about 1½ mile off shore, with the western tangent of the Joinville promontory N. by W. ¾ W. If wishing to anchor further to the southward, care must be taken to avoid Malouine Bank, which extends 1¼ mile off Paris Point, and thence, with an undulating outline, the shoal water preserves about the same distance from the shore, nearly as far as Oweendo Point.

During the fine season vessels may anchor off the southern shore, between Pongara Point and Rogolay Creek, in about 7 fathoms mud, but during the tornado season this anchorage is dangerous. Vessels bound to Obelo Creek for dye-wood, anchor off Cigogne Bank.

" Capt. Vidal gives Gombé Point, near the southern point of this river, in lat. 0° 18′ 5″ N., long 9° 20′ E. On anchoring, he was visited by Tom Qua Ben, brother to King Qua Ben, whose capital is an extensive town. Tom Qua Ben was dressed in the laced coat of a mail coach guard, and, from his well-favoured and portly appearance, did credit to the character. Being the first on board, he was extremely solicitous to be chosen captain's 'tradesman,' producing certificates of the fidelity with which he had acted in that capacity for various masters of merchant vessels which had visited the place.

" These 'tradesmen,' as they term themselves, are generally the principal inhabitants, who are entrusted by the masters of vessels with goods, in order to purchase such articles in return from the *Bullamen*, or natives of the interior, as they require. A man or woman is always delivered up, as an hostage for their honesty.

" The natives of Gaboon are a fine-looking race of negroes; they nearly all speak English with fluency, and generally understand it. But here, as elsewhere, fetishes, carried on the person, are generally worn as protections against poison and violent deaths; and it would appear that they are subsidiary to the resident fetishe, one of whom is supposed to exist in every town. The ordinary cruelties and superstitious observances of the country also prevail here.

" The trade of the river has consisted, principally, in slaves and ivory—the former on a great scale, with the French, Spaniards, and Portuguese; the latter with the English. Camwood was also in great demand during the late war, for army clothing, but since the peace this trade has almost ceased.

"These people, like all savages, are difficult to trade with, postponing the conclusion of their bargains until the patience of those with whom they deal is exhausted; and, when the agreement is made, they commence endless persecution for a dash, or present, *to make friend.* Should the article they part with be valuable, they will take assorted goods only in exchange. Thus, for two large tusks taken on board the merchant brig in the river, weighing together 130 pounds, the native to whom they belonged received the following articles:—four muskets, two neptunes (large brass pans), two iron kettles, four pieces of cloth, assorted fish-hooks, earthenware beads, copper bars, one jar of rum."—*Owen*, vol. ii., p. 320.

Winds.—Along this part of the African Coast, from June to October, the winds vary much from S.S.W. to S.S.E. in the twenty-four hours; which renders it advisable for vessels beating to the southward to tack accordingly, and take every advantage of a slant; also to stand in for the shore after midnight, for the benefit of the land wind, which sets in toward the early part of the morning. The current most commonly runs to the northward, about 18 miles in the twenty-four hours, but sometimes varying to the southward with the change of the moon.

River Gaboon to Cape Lopez.—From Round Corner to Cape Lopez the coast forms a bay, 65 miles in extent between the two points, and presents land more generally elevated than that to the northward, with white downs, covered with trees. At the bottom of the bay the land breaks, and forms several rivers eastward of Cape Lopez, the chief of which is the Ogo-wai or River of Nazareth.

The coast is all clean and safe from Round Corner to a little wooded isle near the coast, called *Fanaes Islet*, which bears from Round Corner S.S.W. 44 miles; with the exception of a reef which extends a mile off shore, in lat. 0° 12′ S., and inland of which are two conspicuous round hills known as the *Paps.* Good water may be procured from a river in lat. 0° 2′ S.; the best anchorage off it is in 6 fathoms, with the northernmost Pap S. ¼ E., and the break in the trees E. by S. ¼ S.; closer in the bottom is rocky. On the coast near Fanaes is a village, and inland of it a town, in the centre of which is a tall flagstaff. *Mount Sangatao*, in lat. 0° 37′ 33″ S., long. 9° 13′ 45″ E., and 7 miles inland, may be seen 20 miles off, and is a good mark for this part of the coast.

From Fanaes Islet the mouth of the River Nazareth bears S.W. by W., 15 miles, being on the same parallel as the extremity of Cape Lopez, or lat. 0° 36′ S. The coast is fronted by extensive banks, of which the outermost is *Lee Shoal*, of 9 ft., which lies 19 miles E. ¼ N. from Cape Lopez, and 9½ miles N.W. ¾ W. from the southern point of Sangatanga Bay. On the West point of the mouth of the Nazareth River is a little town called *Fetishe Town*, upon a low sandy point. Cape Lopez bears from this town W.N.W., 17½ miles, in lat. 0° 36′ S., long. 8° 43′ 20″ E. All the coast eastward of Cape Lopez is low and sandy, covered with trees and bushes, and shoals extend from it to the distance of 5 or 6 miles out to sea in some parts.

The River Nazareth is 6 miles wide at its entrance, but is very difficult to make out, from the low and drowned land it flows through. The whole of this coast is but the delta of the Ogobai or Ogo-wai River.

The OGOBAI or OGO-WAI RIVER seems to be one of the principal rivers of Africa, though it may not have the magnitude or the celebrity of the Niger or Nile. It was first ascended by Lieut. Serval, of the French ship *Pionnier*, in a boat, in July and August, 1862. In 1868, Lieutenant Aymes ascended, in the same vessel, 80 miles above where Lieut. Serval was able to conduct his vessel. It is formed by the junction of two large rivers, at about 160 miles from its mouth, the *N'Gounyai River*, coming from the southward of East, and the *Okanda*, which comes from the N.E. or North, from beyond a chain of mountains seen in those directions, and flows around the basins of the Gaboon and Moondah. Lieut. Serval visited the sacred lake *Eliva Jonanya* at above 100 miles from the Bay of Nazare, and below this the river maintains a breadth of at least 2,700 yards, with a very rapid current and immense volume of water throughout the dry season, and which is constantly fresh, even at high water. Its entrances about Cape Lopez are impracticable, and its commerce finds its way to the Gaboon.*

Its delta has formed the projection of Cape Lopez, whose singular conformation is probably owing to the junction of the two opposing currents, the South African coming northward along the coast, and the Guinea current from the westward, which meet hereabout, and thus neutralize each other.

The *River Nazaré*, or the Nazareth, is one of the mouths of the Ogo-wai. It has but very little depth in the dry season, and runs into the head of the bay of the same name. The land is all exceedingly low, covered with mangroves, and nearly uninhabited.

The position of the mouth of the Ogo-wai River, as shown on the charts, is not to be depended on. In December, 1879, it was fully 2½ miles northward of the Pilot Village; the bar appeared absolutely impracticable, as the surf was breaking violently over its entire length. The depths of water about 1¼ mile outside and parallel with the bar were not less than 26 feet.

In 1872, R. B. N. Walker, Esq., F.R.G.S., ascended this river as far as the Okanda village of *Lopé*, a distance of nearly 300 miles, the last 75 miles of which were a succession of difficult and frequently dangerous rapids. Here he also met the French explorers MM. de Compiègne and Marche. In August, 1875, the French despatched an expedition to explore the whole course of the Ogo-wai, under M. Savorgnan de Brazza, assisted by Dr. Ballay. They spent three years in examining the river and its tributaries, but had much trouble from the ill-will and cupidity of the natives. Above the *Poubara Falls*, in lat. 1° 45′ S., the river dwindled to an insignificant stream, and was found to have no connection with the lakes in the interior. The productions of the basin of the Ogo-wai are similar to those of the Gaboon, red-wood and ebony being very abundant as well as the oil palm and india-rubber creeper, and the usual tropical vegetation. Animal life is abundant, including elephants.

CAPE LOPEZ was originally called by the Portuguese the Cape of *Lopo Gonsalvez;* but it is improperly termed the Cape, being a drowned land, which, at first sight, appears all rugged, and with bushes that seem to stand in the water. It is steep on the sea side, free from flats and reefs, and may be approached as near as convenient. The inner coast trends to the S. by E. for 12 miles, and thence forms a river, the South end of which falls into the sea, on the West, at 21 miles to the southward from the point or cape; thus, in fact, forming an island.

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* See the Révue Maritime et Coloniale, tome ix., Paris, 1863, pp. 66, 296, &c.

A sand bank, on which the French transport *Loiret* struck in 1876, is found to extend about a mile N.W. of Cape Lopez; at this distance there is a depth of 4½ fathoms; at three-quarters of a mile from the point, where the vessel struck, there is only 11 feet.

From the inner part of Cape Lopez a spit of 12 to 18 ft. extends N.E. by E. ½ E., about 5 miles off Prince's Point. In the bay within this there is from 20 to 14 and 9 fathoms. Here also is anchorage, in 8 or 10 fathoms, bringing your small bower to seaward, almost in 12 fathoms; but in the months of June, July, August and September, you need not moor the ship, as the wind blows always from the South.

Good anchorage may be obtained in Cape Lopez Bay in from 7 to 8 fathoms, mud, with the South point of Death Island bearing E. by S. ½ S., and the point South of the watering-place S. by W. ½ W.—*Lieut. M'Farlane*, H.M.S. *Boadicea*, 1881.

When you come from the northward to Cape Lopez, you must take great care to avoid the N.E. spit above-mentioned, as it cannot be perceived until you are very near it; for, at about 4½ miles from the N.E. side of the cape, you may have 10 or 12 fathoms at one cast, and the next find yourself aground.

In this place there is plenty of fish, but no mutton or beef. The negroes are very officious, and for the smallest trifle will supply you with water, wood, and fish.

When you are sailing from the River Bento or Cape St. John to Cape Lopez, always observe which way the *trovado* (tornado) drives the water; and should you lie at anchor when it arises, you must weigh immediately, and get off; if it be in the morning, with a S.W. or South wind, keep to seaward till noon, and then stand again toward the shore with a sea wind; but if the wind does not alter at noon, tack about for all that, and go to the shore, there to anchor in oazy, and sometimes sandy, ground. Too much dependence must not be placed on the charts, as the banks are liable to alterations from the strength of the river currents, &c.

It is high water, on full and change, in Cape Lopez Bay, at $4^h\ 30^m$; the rise at springs being from 4 to 6 feet.

In the narrative of Captain Owen's Expedition, it is said Cape Lopez is in lat. 0° 36′ 2″ S., long. 8° 40′ 4″ E. It is covered with trees, but is low and swampy, as is also the neighbouring country. The extensive bay formed by this cape is 14 miles in depth, and has several small rivers and creeks running into it, some of which, to the southward, apparently communicate with extensive lagoons. On the left point of the largest and northernmost of these rivers is situate *King Passol's Town*, the only assemblage of huts in the bay. The buildings resemble English cottages. The king's residence was at the back of the town, and rendered conspicuous by the difference in its construction and superior magnitude.

Fish is plentiful in Cape Lopez Bay, and the seine may be used with advantage around, and in the vicinity of Death Island. Wood is obtainable, and from Fetish Town, fowls, eggs, and fruit may occasionally be procured.

Sangatanga, Fetish Town, and the neighbourhood, were originally depots in connection with the slave trade. The articles of commerce consist of ivory, tortoise-shell, wax, dye-wood, and ebony; mats also, of a superior description, are manufactured by the natives.

In the country around, elephants, lions, tigers, and buffaloes abound, whilst the numerous streams which intersect the coast are frequented by hippopotami. The natives consider monkeys sacred, and worship them as Fetish animals.

VII.—THE ISLANDS OF THE BIGHT OF BIAFRA.

FERNANDO PO.

This island is 34½ miles in extent North and South, *true*, between the parallels of 3° 13½′ and 3° 48′ N. Its medium breadth is about 17 miles, between the meridians of 8° 25′ and 8° 58′ E. It is very high, commonly covered with clouds, and in clear weather may be descried at the distance of 75 miles. It is situated 19 miles from the main land, the channel between being strikingly picturesque, having the lofty Camaroons Mountains on one side, and those of the island on the other; the distance between the two highest peaks being about 50 miles, but their bases approaching to within 20 miles. *Clarence Peak*, rising near the centre of the island, 10,190 ft. above the level of the sea, is covered with vegetation to its summit. The peak is visible, on a clear day, in coming from the westward, for nearly 100 miles; but at times, in hazy weather, with a northerly wind, it may not be seen until within about 3 miles from the shore.

"All the islands of the bight are doubtless of volcanic origin, as well as the high land of the coast in the neighbourhood of Fernando Po. It is perhaps somewhat curious, that all these islands and the Rumby Hills should be nearly in the usual direction of the wind, or about N.E. ½ E., and S.W. ½ W. The edge of a parallel rule placed on the chart will very nearly cover Anno Bom, St. Thomas's, Prince's, Fernando Po, and the Rumby and Camaroons Mountains. The volcanic influence appears to have been in one direction."—*Captain Midgley*.

In the ensuing description of this important island, we have availed ourselves of the works of numerous authors; in addition to those of Captain Kelly (1821), Captain W. F. Owen (1827), Captain Vidal (1836), Captain Fishbourne (1841), we have taken some details from the more recent observations of Lieut. Fleuriot de Langle, of the French Marine (1844); also of C. Ph. de Kerhallet, of the same service (1852); of an excellent account of the island given by the late Dr. W. F. Daniell, in his "Sketches of the Medical Topography of Western Africa" (1849). Added to these are various accounts by Captain R. F. Burton, who resided here as Consul, and from the works of Mr. Consul Hutchinson, &c.

[illegible][1]

[illegible] did not make pro- [illegible] a war [illegible] appeared and [illegible] Roman Catholic religion as the [illegible] among [illegible] been so long settled under their [illegible] teachers. These, as before stated, soon after left and settled themselves at Victoria, in Ambas Bay, at the foot of the Camaroons Mountains.

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[1] [illegible] M.D., F.R.G.S. 1841 [illegible]

Rapidly succeeding the proclamation came the change of name of the chief town of Clarence to Sta. Isabel, and Spanish titles to all the streets were posted up at all corners. A hospital was erected near Point William.

A more effective establishment, with 150 soldiers, executive officers, &c., came out in August, 1859, and a Royal decree of 39 articles was promulgated for the regulation of the colony, which includes Anno Bom, Corisco, and other dependencies.[*] Of late, however, the island has much declined under the Spanish administration.

The Aborigines of Fernando Po are designated *Adeeyahs* (accented on the last syllable), but they are better known under the term "Boobie," a word which signifies, in their native language, "stranger," and seems to have been applied by them to Europeans, from their friendly salutations of *Cow-way, boobie* (How do you do, stranger?), when meeting together. These inhabitants, in development of form, possess several physical traits that contribute to sever them from those nations populating the alluvial lowlands of the delta. Traces, however, of that structural affinity, which embodies the majority of the negro races into one family, are equally perceptible, although less prominently marked, in those organic points which more closely ally the multitudinous tribes in this part of Western Africa. In corporeal mould these people are well and firmly made, of a pliant and muscular rotundity, in stature slightly above the average negro standard (those of Camaroons excepted), and, from their active and regular mode of life, are of a vigorous and hard constitution. Obesity of figure—so much esteemed by their neighbours of the opposite coast as one of the perfections of a manly organization, and so ardently coveted by the females as the *ne plus ultra* of their beauty—is not appreciated among them in the same favourable light. A moderate fulness of contour, with a disposition to a compact wiriness of the trunk and limbs, may be said to constitute their physical exterior. The cranium, in its outline, partakes of the usual negro conformation, with compressed lateral parietes, retiring forehead, and woolly hair. The face, though somewhat disfigured by their natural tokens, viz., three or four large cicatrized incisions, extending obliquely from the zygomatic arch to the angle of the mouth, is somewhat prepossessing, and, in many instances, resembles those of Europeans. The features, from their attenuation and regularity, are less heavy and unmeaning, while the chin and lower facial outline partially lose that harsh, angular prolongation so predominant in African communities and elsewhere. Their skin, of a brownish black, is frequently daubed over with yellow ochre, and red clayey pigment, the latter of which they likewise incorporate with their hair in transverse bands and long pendant jets. With the exception of a few tufts of dried grass suspended over the pubic region, both sexes are publicly seen in a complete state of nudity; most of them being decorated with broken shells, the vertebræ of snakes, and other rude ornaments of savage life.

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[*] Article 28 declares, "The duties of five per cent. for importation, and two and a half for exportation, will be continued. Anchorage duties of 25 reals for vessels above 20 tons and less than 50; of 50 reals for those of 50 and less than 350; and of 100 reals for those that guage from 350 to above 700 tons above the last guaging. Vessels under 20 tons are free of anchorage."

Article 29. All bonded goods or merchandise are free of duties for importation or exportation, but will pay one per cent. for storehouse expenses.

The inhabitants of this isle, from their secluded and scattered villages, are rarely seen in sufficient numbers to furnish any statistical information; and it is therefore, from the absence of these necessary details, difficult to arrive at any precise conclusion in respect to the total population. They have been computed, at different periods, to vary from 7,000 to 10,000. Within the last few years there has been a progressive increase, and their numbers now would fall very little short of 12,000. They are not amenable to any fixed government, being subdivided into a series of petty tribes, each of which is placed under the jurisdiction of its own independent chief, *Kekkerakoo*, whose power, though unrestrained, is not so arbitrary as the monarchical despotisers of the continental chiefs.

"The Boobies are a quiet, inoffensive, and unassuming race, tolerably shrewd and intelligent, very kind and affable to white visitors, and fully as warlike and turbulent among themselves, as evinced by their frequent fierce intestine wars. Differing in several respects, not only in languages, manners, and mode of life, from other African nations situated near them, they are still, however, tinctured with their superstitious fears and prejudices, adhering, but in a milder degree, to their barbarous laws and debasing customs.

"The Boobie towns are chiefly built on the denuded crests of the midland slopes, and generally consist of from fifteen to twenty habitations, which may be considered as mere sheds. Adjoining them are enclosures for the preservation of sheep, poultry, goats, &c., of which they rear moderate quantities for sale. Surrounding these villages are plantations of yams, cassada, palm and plantain trees, and other clearances set apart for future cultivation. Of late years, the requisitions of homeward-bound vessels have enhanced the value of stock and other provisions; and from the supply being inadequate to meet the pressing demands, the prices have consequently much advanced."—*Dr. Daniell.*

"The Fernando Po oil crop never exceeds—seldom equals—400 tons a-year. A trustworthy observer, who trades in various parts of that island, states that, from the number of oil palms he has seen, at least 4,000 tons might easily be obtained. But the 25,000 aborigines, or boobies, do not choose to work beyond 400 tons. Their wants are few—a cheap musket, a little powder and shot, pipes, tobacco, and rum, are nearly all. If traders could create new wants, trade might increase; but where is the genius who can create a new want for a boobie?"—*Mr. Consul Livingstone*, 1872.

The island is much resorted to by English cruizers and palm-oil vessels, to obtain supplies of wood, water, and coals for steamers. Stock, however, excepting yams, is neither abundant nor cheap. Green pigeons are said to be plentiful, and may be shot by going a short distance into the bush, and waiting for their settling on the branches of the high trees. The forests produce ebony, oak, lignum vitæ, mahogany, &c., and near the shore consist principally of palms and the conspicuous silk cotton tree. There are numerous streams of pure water, but infested with alligators.

Climate.—This is a subject of the greatest importance, and yet it is one on which very opposite opinions have been expressed. Mr. Bayle, colonial surgeon of Sierra Leone (who, however, never visited or saw the island), has in his "Diseases of Western Africa," page 354, given opinions most unfavourable to its utility to Europeans, on account of its unhealthiness. Dr. Daniell, on the other hand, who, having resided there, is better qualified to judge, combats this assertion, and states that in most parts it is quite healthy, and that to pass a general censure on its influences is quite unwarranted from experience. The low shores in some parts, among which the settlement of Clarence may be included, are very productive of disease at some seasons, but this is merely local. "Had those individuals whose anxiety has hitherto been to depreciate the utility, or decry the healthiness of this island, been resident for the same number of years with myself and others in the petilential swamps of equatorial Africa, they would ere this have learned to appreciate the value of the boon so appropriately placed within the grasp of most African voyagers, and one which, above all other considerations, is prized by the convalescent, viz., the rescue from a premature death, and the restoration to the usual occupations of ordinary health."*—*Dr. Daniell.*†

The appearance of the island is extremely beautiful. Two high peaked mountains (one of them remarkably so), the black sand on the beach, and the scoriæ and other substances, which had evidently undergone the action of fire, denote it to be of volcanic origin.‡ From the northern extremity the land rises, in a gradual slope, to a ridge of hills which connect the two peaked

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* The following table, carefully drawn up by Dr. Daniell, from his own observations, combined with those of Colonel Nicholls and Mr. Becroft, chiefly made at the Government House, will give a clear view of the nature of the climate;—

Months.	Temperature. Fahr.				Remarks.
	6 a.m.	2 p.m.	8 p.m.	Mean.	
Jan.	72.0	85.0	80.5	79.1	Fine, clear weather; with light and pleasant breezes.
Feb.	73.0	86.0	84.5	81.1	Fine, but rather sultry weather; fair sea breezes.
Mar.	72.5	87.0	81.0	80.1	Fine weather; light airs and sea breezes, occasionally sultry.
April	71.0	84.0	80.0	78.3	Weather much cooler; slight rains towards the end of the month.
May	70.0	80.5	74.0	74.0	Rains and strong sea breezes; occasionally tornadoes.
June	69.5	80.5	70.5	70.5	Rains heavy; cloudy weather, with tornadoes.
July	71.5	80.0	74.5	75.3	Rainy and cloudy weather; with occasional tornadoes.
Aug.	70.0	80.5	76.0	75.5	Rains decreasing; frequent calms and slight showers.
Sept.	67.0	79.0	78.0	74.7	Ditto; slight showers, light sea breezes.
Oct.	71.0	80.0	76.0	75.7	Fine weather setting in; sea breezes, with occasional showers.
Nov.	73.0	83.0	76.0	77.3	The commencement of the dry season; fine weather.
Dec.	73.5	84.0	76.0	77.8	Fine, clear weather; sultry, with light winds.

† Medical Topography, &c., p. 162.

‡ The peak (Clarence Peak) was first ascended by Mr. Becroft, in 1843, when the crater appeared to have been of a very ancient date, and was composed of pulverulent lava, around which existed a circular space destitute of any vegetation. In altitude it is 10,190 ft. above the level of the ocean, and in fine clear mornings of the rainy season may be observed from the town of Old Calabar, a distance beyond 100 miles.—*Dr. Daniell.*

mountains, and the whole surface of the slope is covered with a forest of trees of the most luxuriant growth. Beyond this region of wood, the crest of the hills, and the sides of the mountains, as far up as about one-third of their height, appeared to be generally in a state of cultivation; on the summits of these hills stand the towns and villages of the natives. The houses are of wickerwork, all nearly of the same size and plan; they are built round an open area, and each is surrounded with a railed fence, or inclosure, within which their cattle are shut up at night.

"Numberless little streams were trickling down the sides of the hills into a noble bay on the North side of the island; besides three very considerable rivers, one at each extremity, and the third about the middle of the bay; at all of which ships may water with the utmost facility. A small island, covered with wood (which may be procured here in any quantity), and inhabited by about a hundred families, who subsist by fishing, affords shelter to that part of the bay within it. Though the thermometer rose to 86° F. in the afternoon the land and sea breezes gave to the temperature a freshness quite unknown on the adjacent coast. And, as a proof of the goodness of the climate, it may be observed, that no appearance of those loathsome diseases—elephantiasis, scrofula, guinea-worm, hydrocele, &c., to which the negroes are so subject—was perceptible among the many hundreds who crowded to the coast on the occasion of this visit.

"Round the bay the country rises in a grand and beautiful amphitheatre. 'Next to the Bay of Naples,' says Captain Kelly, 'I know of no place more capable of being converted to a finished picture by the hand of art and industry than this; let only the immense forest on the slope give place to cultivated plantations of sugar canes, the brows of the hills be studded with coffee trees, and a town of sufficient importance to form the capital of the island be built on the rising ground near the East angle of the bay, where a river would flow beneath it, navigable for boats drawing 7 and 8 ft. water, and Fernando Po would far surpass any of the islands of the British possessions in the West Indies.'"*

The island, being a Spanish possession, ought in reality to possess a Spanish nomenclature; but having been surveyed and occupied by the English, most of its points and features are generally known by English names. Nevertheless, as there are Spanish names now superadded, in the ensuing description, &c., we have included them, written in parentheses, where they occur simultaneously.

CAPE BULLEN (Cabo Formoso), the N.W. point, is a considerable projection, to the S.W. and S.E. of which the coast forms small bays. Around its foot are a large number of rocks, which do not extend far off; and, moreover, most of them are visible. On its summit are some remarkable and very high trees. The North coast of the island runs 13 miles nearly in a straight line to Cape Horatio, the N.E. point, presenting a great number of small bays, the chief and best of which is Maidstone Bay (Santa Isabel).

At 4 miles S.E. ½ S. from Cape Bullen is a low point called *Ponta de la*

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* See Mr. Consul Hutchinson's "Impressions of Western Africa," chapters xii. and xiii., for a good account of the island and its people, in 1856.

Trinidada, remarkable by a large tree; it is the West point of a slender bay, with a sandy beach 1 mile in extent. Its East point is *Ponta del Condo*, pointed and projecting, and separating it from *Cockburn Cove* (Bahia da Venus), which, like the former, has a brook *Cockburn Brook*, running into it, but otherwise full of rocks. *Point Adelaide* (Ponta Christina), a projecting hummock, separates the latter from the *Bay de St. Isabel*. Off Point Adelaide is *Adelaide Islet* (Isleta Don Henrique), which from the offing appears as three islets. It stands on a bank of from 3 to 10 ft. water, and forms, with those of Adelaide Point, a passage not more than 100 yards wide, and 9 or 10 fathoms deep. The islet and its surrounding shoals form the western side of Maidstone Bay. The mark for clearing the edge of the bank is to keep rather to the East of Point Adelaide.

MAIDSTONE BAY (Santa Isabel Bay) is a shallow bay, 4 miles in extent with soundings gradually shoaling inward from 24 fathoms. On its eastern side it is bounded by a tongue of land, named *Point William* (Peninsula Fernanda), within which, on the West, is a semicircular bay, called *Clarence Cove*. The western point of this cove, Point Adelaide (Ponta Christina), bears from Point William S.W. by W. ½ W., distant half a mile. Adelaide Islet, off Point Adelaide, is in lat. 3° 46′ 15″ N., long. 8° 47′ 17″ E. This place was surveyed by Lieut. James Badgley, R.N.; he gives the time of high water, on full and change, at 4^h; rise, 7 ft.

In *Gravina Bay*, to the westward of Clarence Cove, is the coaling depôt for steamers, and there is good anchorage in 17 fathoms half a mile off shore.

CLARENCE, or Santa Isabel.*—The anchorage of Clarence Cove, the principal roadstead of Fernando Po, situated on the North side of the island, is very good, though the depth is from 10 to 15 fathoms; indeed, it is so abundantly sheltered, that considerable facility is afforded to vessels loading and unloading; while the perfect tranquillity and smoothness of the water, and the rise of 7 ft., admit of vessels being beached for repairs without danger. It is, however, hot and unhealthy. The entrance to the cove lies between Point William and Adelaide Islets, but the actual channel is narrowed by shoals on both sides to 2½ cables. Having recognised Point William and Adelaide Islets from seaward (which are difficult to identify on account of the high land behind them), steer in S.E. by S. ½ S., midway between the two, passing close outside of the buoy off Point William, and anchor where most convenient. If the buoy be gone, the lamp-post on the pier bearing S.E. ½ S. will lead in.

In order that vessels entering into, and departing from the port of, St. Isabel may avoid the banks off Point William, a *red* buoy with *white* globe, about 7 feet in height, has been moored off them in 6 fathoms, low water, bearing W. by N. ½ N. from the lighthouse, distant about 316 yards. It must be borne in mind that the current runs to the East and N.E. generally, 1 to 1½ mile per hour, and due allowance must be made for this, in steering either for the settlement by day, or the light by night, depending on the preceding winds. Change in the bearings would give notice of this, and they should be attended to strictly.

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* Description, &c., principally by Capt. Fishbourne, R.N. It should be remarked that a great change has been effected since the Spanish assumption of authority

Point William & Light.—Point William, or *Fernanda Point*, is the northern extremity of a rocky peninsula, about 70 yards broad, which projects about 3 cables in a northerly direction. The lighthouse stands near the extremity of the point, and exhibits a *fixed bright* light, visible in clear weather for 6 to 8 miles.

The landing-place is convenient at a wooden pier, which was built at the expense of the West African Company, and extending out to a depth of water that admitted vessels of 7 or 8 ft. draught to go alongside. A small *fixed green* light is usually shown until midnight, from the end of the pier.

The ascent to the plateau, upon which the town stands, being about 100 ft., and the road ill made, occasions much difficulty in the transfer of goods to the town; but this objection might be materially removed, and without much expense. There is a strip of land at and on either side of the landing-place (from which the cliffs rise nearly perpendicularly), now partly occupied by miserable coal and store sheds, but of sufficient width, and generally adapted for good store rooms.

Clarence Town is situated on a plateau, 100 ft. at least above the level of the sea, and receives much of the prevailing S.W. wind; but as this passes over a portion of land not yet quite clear, its salubrious effect is much diminished, as it must be surcharged with vapours. The houses are built of wood, seldom of more than one story, regular, and cleanly; even taste is perceptible in their little arrangements, and a measure of comfort which implies circumstances far removed from want. The inhabitants, principally liberated Africans, cultivate fruit and vegetables, and also raise goats, pigs, and poultry.

The fall of water in Hay or Horton Brooks, the former quite close to the town, is fully equal to turning mills for sugar, corn, and wood; and the ground so well adapted, that little expense would attend the preparing sites, &c., for regulating the supply of water.

The water is good, and may be obtained in any quantity without difficulty, from a spring on the South side of the cove. Wood is plentiful, and of very superior quality, quite equal to the mangrove; 340 ins. per horse power per hour being sufficient to keep steam with our engines working expansively at half stroke, yet still an efficient fuel. We paid 6*s*. 6*d*. for 100 pieces, containing about 33 cubic ft.; but were a contract entered into for a large quantity, it might be obtained at a much more reasonable price.

Though this place is so near the Bonny, Calabar, and Camaroons, few vessels touch here; nearly all going to George Bay, where there is a settlement of Krumen, who sadly maltreat the natives, and even supply the shipping with yams at their expense, or only give them nominal value.

I believe it is not generally known that there is excellent anchorage all along the North coast of Fernando Po, from the West point of Maidstone Bay to within a mile or two of Horatio Island. If bound to Clarence in the night, any ship may run round Cape Bullen with the greatest confidence, and anchor in 18 or 20 fathoms water, with the peak, which is generally visible, bearing S. by W., or South; she will then be to windward of the harbour, and in the fairway for it. When at anchor in the harbour, the peak will bear S.S.W. This is a good mark for finding the cove in the night. The centre of Clarence Cove is an excellent berth for anchorage, and the depth will be 13 or 14 fathoms.

Eastward of Point William there is less water; 10 fathoms, with soft bottom, will generally be found at a short half a mile from the land; but it is most prudent to anchor in not less than 12 or 14 fathoms. The stream anchor is sufficient to use outside the cove; and, when inside, the bower anchor.

"A strong and useful wharf formerly stood in the centre of Clarence Cove, and constituted the landing-place of the town; it has now partially disappeared, and the black sandy beach on either side of it answers the purpose. Some ruinous sheds and storehouses, once the property of the defunct African Company, lie around it; and to the left of them, on the strand, is a cleared space, on which the trading canoes of the natives are drawn up.

"The road leading to the town obliquely winds to the summit of the almost perpendicular acclivities, nearly 100 ft. in height, the ascent of which, from their steepness, is extremely inconvenient. Commanding a prospect of the bay, is a range of seven or eight substantial and well-built houses, whose snow-like exteriors may be discovered many leagues distant. They are now inhabited by the missionaries and more opulent colonists. Midway on Point William* is the building that once was reserved for the hospital of the settlement, and the sickly crews of vessels, but now ignobly desecrated by mercenary uses wholly in opposition to the humane intention of its founders. Though of restricted dimensions, and somewhat inefficient in its internal economy, its healthy and congenial site, isolated from the town, with its loitering inhabitants, somewhat partially redeems these deficiencies.

"In the vicinage of the hospital may be traced the ruins of the magazine (built of stone), blacksmith's shop, and other buildings; and farther to the northward may be seen a small monumental obelisk, with an appropriate inscription, recording the melancholy fate of those persons who perished in the ill-fated Niger Expedition.

"The town of Clarence is erected on a clear and level area, greatly declining as it approaches the base of the chain of woodland hills that skirt it on the West. The plan of the town is that of a square, whose largest diameter exceeds three-quarters of a mile, from the lateral prolongation of the houses at irregular intervals. Two or three principal avenues pass from one common thoroughfare on the verge of the beach, and are intersected at right angles by a number of lesser streets, all of which are uniformly wide and spacious, but disgustingly dirty. The native dwellings, composed of pieces of wood roughly fashioned and put together, and roofed either with shingles or palm-leaf mats, seldom rise above one story in elevation, except in a few instances, such as those of the more respectable inhabitants, and the government officers previously alluded to. They occupy, in picturesque arrangement, both sides of the street, the majority of them being whitewashed externally, which gives the whole an air of neatness and comfort. The greater portion of these habitations, however, are falling into a state of decay.

"To the southward of the town, half concealed by thickets and dense masses of foliage, is the burial ground of the colony. In it lie interred the remains of Richard Lander, Capt. Bird Allen, R.N., Dr. Vogel, the celebrated botanist, and others, whose graves, with those of the inhabitants, are overspread by a luxuriant carpet of grass and weeds. Behind the cemetery is Hay Brook, a rivulet of fresh water, highly extolled by the inhabitants for its excellent qualities, particularly for the cleansing of clothes and other domestic uses. On the western outskirts of the town is a congregation of mud hovels, termed Kru Town, from a number of stray Krumen making it their temporary home. From this suburb a road to the left leads through the woods to Cockburn Cove, a mile distant, into which a small running stream (Cockburn Brook) empties itself."*

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* Captain Kerballet says, in his description of the place, that on the extremity of Point William (Punta Fernanda) is a large tree, to the East of which is the hospital; and farther on the lighthouse stands at 200 yards from the point. This lighthouse was originally established by the West African Company.

On the East of Point William is a small bay named *Goderich Bay* (Bahia del Nervion), three-quarters of a mile in extent, and indented by several little coves, in two of which are the mouths of rivulets, called *Hay Brook* and *Horton Brook* (Rio de San Nicolao). Between these brooks, to the distance of three-quarters of a mile inland, there is now cleared level land, on an elevation of between 100 and 200 ft. above the sea; and westward of Hay Brook, between it and Cockburn Cove, is similar cleared land. The East point of Goderich Bay is *Point Goderich* (Pta. del Consul), which is low, and some rocks off it. Horton Cove is called by the Spaniards Ensenada de Gravina.

The East point of Horton Cove is *Point Horton* (Pta. Romey), rounded in form, rocky, and having some rocks at its foot. This is the West limit of a small clean cove (*Ensenada de Romey*), the eastern part of which is *Oyer Point* (Pta. de San Nicolao); beyond which is a rocky cove opening to the N.W., bearing the name of Ensenada de San Nicolao. *Bottlenose Point* (Pta. del Amirante), conspicuous from a large tree, bearing S.E. by E. ¼ E., 1 mile distant from Point William, bounds it on the East, and is 7¼ miles W. by N. ½ N. from Cape Horatio, the N.E. point of the island, the coast between being rocky, and with a great number of small coves. The coast is wooded and quite clear.

CAPE HORATIO terminates in a sharp point, near which are some rocks, one of which forms a tolerably large islet. The cape is high, very steep, and densely wooded. From it the East coast trends southerly for 7 miles, and then nearly in a straight line S.W. ¼ W., to Cape Barrow (Cabo Agudo), the S.E. point of the island. This coast is rocky, abrupt, and broken by a large number of points, leaving between them small coves, with numerous rocks at the foot of the cliffs. About midway between the two capes is a small rocky islet, *Leven Island* (Isleta de Caracas); it is high, but when seen from the East it is undistinguishable from the land, although half a mile from it. To the W. by S. of this islet is a bay bestrewed with rocks and rocky islets in its entrance.

Melville Bay (Ba. de Caracas), 3 miles S.W. from Leven Islet, is clear, but is very deep, there being 64 fathoms at 1½ mile from its East point. It is entirely open to winds from East and S.E., which blow violently during the tornado season, and the bank off shore is very narrow. For these reasons the East coast of the island is little frequented; the anchorages are bad and dangerous, and any vessel caught here in a tornado is in the greatest peril.

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* Dr. W. F. Daniell, "Medical Topography," &c., pp. 144—148.

Cape Barrow (Cabo Agudo) is a high rocky point, surmounted by a small hill 2 miles inland. Like the rest of the island, it is densely wooded above the rocky cliffs. From this point to Cabo Redondo, the South coast trends N.W. ½ W., 17½ miles, and has the same characteristics as the eastern side. It possesses no shelter against the very heavy sea frequently thrown in by the S.W. to S.E. winds. The land rises very abruptly to two peaks not far from the coast. *Cabo Redondo*, which is the true S.W. point of this island, is, like the rest of the cape, very steep, densely wooded, and with deep water close to it. *Cape Badgley*, according to the charts, is 3 miles N.N.W. of it.

GEORGE, or WEST BAY.—At 9 miles N.E. ½ E., from the S.W. point, is the southern point of George Bay; it is a slight projection of moderate height, called *Charles Folly* (Pta. San Carlos). From this the South shore of the bay runs E.S.E. for 4¾ miles, and is very much broken and rocky. At the distance above mentioned there is an islet a cable's length off shore, but connected to it by a reef; and beyond this the coast forms a curve sweeping to the northward, the shore consisting of a sandy beach, but the dense woods of the plain behind it reaching nearly to the sea. Several brooks here fall into the sea, from which good water may be got; the best of these watercourses is in the northern part of this bay. *Point Cabras*, or *Kelly*, the North point of the bay, and 6 miles E. by N. from Charles Folly, is rocky and irregular; when seen from W.S.W. it terminates seaward in a gentle slope.

The bay is quite clear, the depths being from 30 to 35 fathoms in its opening, diminishing irregularly to 7 and 9 fathoms, mud or muddy sand, at a quarter of a mile from the head of the bay. In coming to this bay, it is best to approach it from the southward. Cape Badgley is the best point to make, on account of the N.E. current which sets along this shore. The bay is perfectly safe and sheltered from all winds; the only thing to be guarded against are the gusts which come from the high lands. Wood and water are easily procured. Should fresh provisions be desired, a gun fired once or twice will bring the natives to the vessel with the same sort of stock as at Clarence Cove, barter (iron goods) being the mode of purchase. The bay is preferable to Clarence as an anchorage; it is easier of access, and is much larger. The seine may be easily drawn, and fish is very abundant. It is high water, on full and change, at 4^h; springs rise 7 feet.

Goat Island (I. das Cabras), in lat. 3° 32′ 50″ N., long. 8° 34′ 38″ E., is 1½ mile N. by E. of Cabras Point, and is rocky and high. Between it and the point there is plenty of water. At a third of a mile inshore of this islet is another and smaller; and one-third of a mile E. by N. ½ N. of this again is a low rock surrounded by breakers: these are called the Kids. The coast at this point forms a small bay with an irregular sandy beach.

From this point to Cape Bullen (Co. Formosa), the West coast of the island consists of rocky cliffs. It is much broken, and in many parts has projecting rocky points, forming as many useless bays. One of these is 9 miles from Cape Bullen, the South point of which is called *Point Achada*, or *Boteler*. Between this and Goat Island the shore is clear, and has no rocks at the foot of the cliffs. One dangerous ledge alone exists, at 5½ miles N.E. by N. ¼ N. from Goat Island, and 1½ mile off shore. There are two rocks on it whose tops are visible, called the *Boteler Rocks* (Rs. das Aves). The ledge lies N.N.E. and S.S.W., two-thirds of a mile, but is narrow, leaving a clear passage between them and the coast.

Currents.—From what has been said previously relating to the motion of the water at this part of the Bight, it must be manifest that this must present some of the most singular features of any in the world. The Guinea Current, which runs so constantly and rapidly towards the head of the Bight of Biafra, strikes the shores of Fernando Po, which is, therefore, under its influence. The motion of the waters around it, however, appear to be variable. But it may be affirmed, that generally on the West coast the currents run to the N.E. with a velocity of from 1 to 1½ mile per hour, and on the North shore they vary between East and E.N.E. with the same velocity. On the East coast they are found to run to the N.E. or N.N.E., when near the island; but further off they take a more and more decided direction to the North, N.N.W., and N.W. But they are very variable in this part; their rate is from 1 to 1½ mile an hour.*

The following directions for, and description of, Fernando Po, were written by Mr. Finlaison, when under the command of Sir George Collier.

Ships bound from Bonny River to George Bay, on the West side of Fernando Po, should endeavour to make the West end of the island; for there is such a strong current setting to the E.N.E., that, with baffling winds, it will take them several days before they get up, if they once get to leeward. The bay may be easily found by observing the following directions:—When you first see the island, on coming from the N.W., it makes in two peaks. The easternmost one is the highest, and is most peaked to a sharp point; the westernmost is also very high, but is round to the top, sloping gradually to the water's edge. Should you fall so far to leeward as to get the easternmost peak to bear East or E. by S., you must tack and close in with the westernmost side, until you get close to that side, or the West side of the bay; you can then run along shore within 1 or 2 miles of it, until Goat Isle is in sight; the soundings will be found regular, from 30 to 25 and 16 fathoms. To anchor, bring the East peak to bear E. ½ N.; Goat Island, N. by E., or touching *Point Kelly*, the N.E. point of the bay: and the western extreme point of the bay, W. by N. ½ N., in from 20 to 16 fathoms, three-quarters of a mile off shore. Here two small rivulets, very convenient for watering, and also for wooding, will be found. A ship, if in want of stock, such as fowls, sheep, goats, or game, should fire a gun or two, when the natives will bring down everything they have to dispose of. The only thing they seem to place any value on is any sort of iron, especially knives, swords, &c. The principal ornaments these people wore about the neck were chicken-bones, glass beads, and bits of shells; their hats were made like small baskets, and had a few feathers on them, in form of a cockade. Of their women, the men did not seem to be the least jealous; but it must be admitted that the females were the most modest set I ever met with on the coast of Africa. During the time we were there, no intercourse whatever took place between them and our crew.

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* "Manuel de la Navigation a la Cote Occidental d'Afrique," tome iii., p. 20.

George Bay is a good place for hauling the seine, and has plenty of fish of different sorts, such as mullet, bream, and various other kinds; there is also turtle in the bay, and the water is good. The natives would by no means allow us to penetrate into the interior of the island.

In the Book of Directions, it was said that Fernando Po makes in three hummocks. When we first made the island, we observed three hummocks, but it was afterwards found that one of them was the high land of Camaroons, —so deceptive is that land at a distance.

ILHA DO PRINCIPE.

Ilha do Principe, or Prince's Island, is a Portuguese possession, and, although much smaller than Fernando Po, is very remarkable for its physical features and aspect. It is about 9 miles in length North and South, and 7½ miles in its greatest breadth, but 4½ miles is its average extent East and West. The bank surrounding it extends about 3 miles to the North and East, with irregular depths. To the S.W. it reaches in some parts to 12 miles, as far as the islets named Pedras Tinhosas, and on the West it seems to extend about 5 or 6 miles off, but this part has not been completely examined. The island lies S.W. ½ W., 115 miles from the S.W. end of Fernando Po.

Of the discovery of this island the date is not exactly known; the historians of the period having been more occupied in recording the martial exploits of their sovereign, Affonso V., than in reciting the progress of maritime discovery. However, it is tolerably certain that Joao de Santarem and Pero de Escobar, two Portuguese knights of the Casa d'El Rei, in a voyage beyond Cape Palmas, began in 1470, after discovering St. Thomas, Anno Bom, and Cape Lopo Gonçalvez, saw this island on the 17th of January, 1471, the feast of San Antonio Abbade, and hence it was at first called *Ilha de Santo Antao*, or *Santantam*. The name, *Ilha do Principe* (or *Prince's Isle*), was given to it when its revenues from sugar were granted to the eldest son of the King of Portugal, about the year 1500.*

The general aspect of the Ilha do Principe is similar to that of Fernando Po; but it is more singular than that island, from the leaning mountains and the needle-shaped peaks which jet perpendicularly from the mountains in the interior. The Pico Charrote and the Bico do Papagaio are, perhaps, the most remarkable features in the world. The northern part of the island, although high, has only hills, among which a large number of rivulets run toward the sea. The southern part, on the contrary, is a series of rugged and steep mountains, surmounted here and there with natural obelisk-formed pieces of granite. The soil is exceedingly fertile, but there being much rain, the luxuriant vegetation causes the island to be unhealthy. In many parts there are traces of extinct volcanoes, and large spaces are covered with volcanic stones, called there Budo Judeu, which serve for building.

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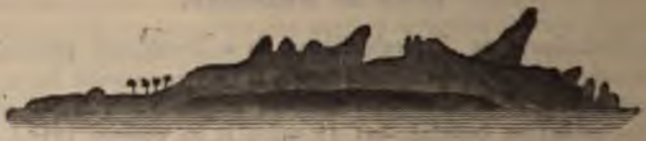
* Ensaios sobre a statistica das Possessoes Portuguesas, por José J. Lopes de Lima. Livro II., parte I., p. 6; and parte II., p. 23; also Torre do Tombo, Livro das Ilhas, pp. 39, 40.

The first chain of peaks are connected together, traversing the island from N.W. to S.E. The Bico do Papagaio (parrot's beak) is the principal peak, and is remarkable from its hooked form. It terminates on the N.W. shore in the peaked *Pico Podrim.* A second chain runs at an acute angle with the former from a peak at the S.E. part of the island to N.W. ½ W. In this chain is the *Pico Charrote* (rugged peak), and O Pico (the peak), the highest mountain in the island. It terminates in a perpendicular needle, nearly in the centre of the island, and 2,700 ft. high, according to M. Fleuriot de Langle. Ilha do Principe, in clear weather, may be seen at 60 miles off, and is easily recognized.



Prince's Island, S. by E. to S.S.E., 15 miles; as seen by Captain James Wallace Monteith.

The principal articles exported from the island are coffee, cocoa, cinnamon, and annatto; black pepper and cloves may also be obtained. Sugar was formerly cultivated, but is now abandoned. Beef may be obtained at Santo Antonio and West Bay, and occasionally pigs and poultry, but not in large quantities. Fruit and vegetables of all kinds are grown, but yams and sweet potatoes are scarce; in the forests are many valuable and useful woods. Water is easily procurable, and is of good quality. In 1874, Commodore Sir W. N. W. Hewett, R.N., reported that no coal, nor supplies of any kind, could be procured on the island.

The climate, like that of the Gaboon River, is very hot and humid, but not so much so as on the continent. There are but two seasons—that of the tornadoes and hurricanes, from March to September, the pleasantest part of the year; and the rainy season, from September to March, during which period, also, violent storms are frequent. The dry months are July and August, which is also the period of the S.W. breezes.*

Nearly the whole of the population of the island resides in the town of Santo Antonio, the only one in the island, for there is not another place that merits the name of a village. The total population of the island, according to the official returns of 1844, was 4,584. The number of fire hearths was 624. Of these, there were of whites and mulattoes (pardos), 80 men, 58 women, together, 138; of blacks (pretos), 476 men, 646 women, together, 1,122; of slaves, men 1,851, women 1,473, together, 3,324—making the total of 4,584. If the healthiness of the island is indicated by the age of the inhabitants, it must be congenial, for one-fourth of the whites and mulattoes were above 60 years of age, and nearly one-fifth of the blacks were so also.*

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* Colonel Sabine's Remarks on the Climate of the Islands of the Bight of Biafra are given on pp. 74—75, ante. In the work, frequently quoted here, "Medical Topography," &c., of Guinea, by Dr. W. F. Daniell, pp. 166, 175—179, 184, will be found some very important remarks on the climate, which our space will not allow us farther to extract.

In approaching Ilha do Principe, it is generally recommended to do so from the South, to avoid being drifted to leeward by the currents, which most often run to N.E. and N.N.E. at the rate of 1 or 1½ mile an hour. This precaution is most necessary if going to the Bahia das Agulhas, or West Bay; but if bound to that of Santo Antonio, it is not of great consequence whether you round the island to the South or North, as there is no difficulty in fetching the bay from the latter. At 20 or 22 miles to westward of the island a large number of sea-mews and other birds are generally met with. In hazy weather this fact is useful, as it is also during the night, when the passage of the ship disturbs them from their rest on the surface, and they rise and utter peculiar cries.—(*M. Kerhallet.*)

PONTA DA FLORA, the N.E. point of the island, is rocky, and shows some abrupt cliffs. At rather less than 2 miles N. ½ W. of the point, with a clear channel between, is a naked, blackish, ferruginous rock, called the *Pedra da Galé* (or *Galha*), or *Bird Islet.* It is 9 ft. high, and by night is very dangerous, as it is very steep-to. Fish is very abundant near it. *Ilheo Bom-Bom*, half a mile E. by N. of Ponta da Flora, is high, roundish, and covered with wood; it is clear on its northern side, but is connected to the shore by a sandy spit. Hence to *Ponta das Burras*, a distance of 2 miles S.E. by E. ½ E., the coast is irregular, but there is anchorage off it. The point is high and rocky, but the breakers do not extend far off.

Ponta do Mosteiro (Monastery Point), the N.E. point of the island, is 1½ mile S.E. of Burras Point; close to it is a black islet, called *Ilheo de Santa Anna*, and farther off, at 6 or 7 cables E. by N. of the point, is a cluster of black rocks connected with the point by a shoal. The largest of these rocks is called *Ilheo do Mosteiro*, and is about 25 or 30 ft. high. It is very dangerous to pass between these rocks. On the same parallel, at a cable's length off, is a second islet, smaller and lower, called *Ilheo do Diamante*, in lat. 1° 40′ 42″ N., long. 7° 27′ 54″ E., on which the sea breaks with great force. These islets should be passed to eastward not nearer than one-third of a mile, when the depth will be 30 fathoms; and when they bear South you must guard against the current, which sometimes sets strongly towards them. To the South the coast is entirely rocky, and lined with breakers. It forms a slender bay, called *Bahia das Cabras;* the bottom throughout it is rocky. Its South extremity is *Ponta da Capitao*, which is clear and steep-to; it is the North point of the Bay of Santo Antonio.

SANTO ANTONIO BAY is the principal bay of Prince's Island, and is comprised between the last-mentioned point and that of *Ponta da Garça* to the South, they being very nearly on the same meridian, and 2½ miles apart. The shores of this bay are very rocky, and between the points are sandy coves, in which there is generally a quiet sea. There is an inner bay, which cannot be made out very well from the offing, and at the head of this is the town of San Antonio. The bay has the inconvenience of being exposed to East and S.E. winds, which blow during the tornadoes, but it has good holding ground. It is also somewhat difficult to penetrate, on account of the usual North and N.E. current, and the prevailing South and S.S.E. winds.

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* These particulars, and the description and directions following, are derived chiefly from the work of J. J. Lopes de Lima, just quoted; from the Manuel, &c., of Ch. P. de Kerhallet; the Description Nautique, &c., by Le Comte E. Bouet-Willaumes; and the Medical Topography of Guinea, &c., by Dr. W. F. Daniell, F.R.G.S., &c., in addition to the descriptions given in our former editions.

Ponta da Capitao, is a narrow tongue of moderately high land, and is the East point of a secondary bay called *Praya das Formigas*, which has a fine sandy beach. *Point Santa Anna*, which is the West point of this beach, is high and wooded, with low cliffs, on which formerly stood a low fort. Off this point, a cable's length distant, is a group of islands called *Os Roques*, the highest being 65 ft. high, and covered with bushes. At one-third of a mile S.W. by W. of this is *Santa Anna Rock*, an isolated rocky head, with 12½ ft. water over it; it does not show, and, being 2 cables' lengths off shore, requires caution. On the summit of the hills above the bay to the West of this point, where the cliffs end, is the small chapel of Santa Anna. Beyond this the coast is high and wooded, but the rocks forming it will allow of landing in the small sandy coves between them. The North shore continues of the same character up to the town, before arriving at which, two large houses are seen—the first called *Casa Ferreira*, the second *Casa Gaetana*, which is the residence of the governor. Landing is easy here at the pier or jetty, constructed in front of it. Boats cannot go farther up the bay than this, on account of rocks.

The City of Santo Antonio, as it is styled, extends across the head of the bay between two rivers, that of Dos Frades to N.W., and Do Papagaio to S.E. It stands on a low, marshy plain, over which the sea sometimes flows into the streets. It is sheltered by high hills, covered with wood, and is so damp, that the houses are compelled to be built on piles, the ground floor being the usual habitation of domestic animals. The houses are built of wood, of a wretched appearance, and often tumbling down in ruins. The town is tolerably regular, and contains six churches. It may be easily imagined what the salubrity of the place is from its position, under a burning and humid climate. But the population returns do not warrant us to infer that the climate is very deadly to the residents.

Fruit, yams, poultry, and potatoes, may be obtained. The Portuguese mail steamer from Lisbon calls here once a month.

From the Rio do Papagaio the South shore of the bay runs to the eastward, and is of the same appearance as the North side. At one-third of a mile from the town there is a watercourse flowing through a very deep valley, which furnishes excellent water. It is called the *Agoada dos Portuguezes*. Near it is a large house, called San Joao; and at four-tenths of a mile farther on is a second watercourse, called the *Agoada dos Franceses*, also an excellent watering-place. In general, it is better to procure supplies from any of the brooks here at low water. Near the latter brook is the coaling depot for the steam vessels of the French stationed on the West coast of Africa.

From hence the coast trends to the N.N.E., forming a large projecting point called *Ponta do Demonio*, on which is a fort, mounting ten or twelve guns, in which is a staff, carrying the Portuguese flag. This Fort da Mina has its walls whitewashed, and hence is easily made out. *Demonio Rock*, of 3¾ fathoms, lies 2½ cables East of the fort, and has from 4 to 6 fathoms around it. At half a mile S. by E. ½ E. from Ponta do Demonio is *Ponta Pequena*, high and wooded, as is the whole of the coast, and off it is a reef, a cable's length in extent. It is the West point of the bay of the same name, which is the best anchorage a vessel can take which draws above 18 ft., because it is sheltered from all winds. Its East point is called *Ponta do Risco* (Danger Point), so called from some projecting and covered rocks. The bay called *Praya Salgada*, half a mile to the E.S.E. of this point, is deep, but the soundings do not show more than 4 to 3 fathoms water at its entrance. There is a stream of water at the head of the bay in each angle, near each of which is a large house and a chapel, surrounded by huts. From *Ponta Abbada*, the East point of this bay, to Ponta Garça, a rocky projecting cape, covered with trees, the coast trends S. ¾ E., half a mile. The latter cape is steep-to, and may be rounded closely.

Anchorage in the Bay of Santo Antenio may be taken with the flagstaff in the fort bearing S. by W., and the chapel of Santa Anna about N.N.E., in 5 fathoms, muddy bottom. This is the best sheltered spot, but it is close to shoaler water. It is high water in the bay at $3^h\ 45^m$; the tides rise, at springs, 6½ ft.; at ordinary times, 5 ft. 10 in., and are very regular. The currents are not so, but the tidal streams in and out of the bay are weak.

The *eastern coast* of the island, southward of Ponta da Garça, forms *Broad Bay*, 4½ miles in extent, limited to the South by *Ponta da Mai*. The coast of it is formed of rocky cliffs, many of which show deep red patches. A little to the northward of its South end is the point of junction of the two ranges of mountains, which extend across the island, and a patch of rocks extends half a mile off shore. South-westward of this the coast, always rugged and high, extends to *Ponta do Pico Negro*, the South point of the island; it is a tongue of land, abrupt on all sides, with rocky cliffs, and close off its extremity is a sunken rock, which usually breaks. At 1½ mile S.E. by S. ½ S. from it is a large islet, about 850 ft. high, covered with bushes. It is of a singular form, and is called *O Caroço*, or, on some charts, *Ilheo Carocha* (the Mitre); by the English it is called the *Dutchman's Cap*, from its form resembling a hat of the 17th century. As seen from the S.E., it seems to join the land; it is very steep-to, and the channel within it is clear, with 25 to 30 fathoms, black sand. A low rock lies off its South point.

The *South coast* of the island, between Ponta do Pico Negro and Ponta Grossa, 3 miles to N.W. by W., forms three bays, separated by rocky points; the shores of each are very rocky, high, and wooded, and are commanded by the high peaks of the southern chain of the island. *Ponta Grossa*, the S.W. point of the island, is a high, rocky cape, formed by a hill called *Barriga Branca*, which, when viewed from the S.E., shows two conical peaks close together, called *As Mamas* (the Paps). The point is clear and steep-to. *Ponta da Formiga*, 2½ miles N. by W. of Ponta Grossa, is the South point of a small cove, with a sandy beach, but which does not afford any shelter.

Ponta das Agulhas, on the North side of the cove, is the western point of Prince's Island, and is also the S.W. limit of the West Bay, the safest and best on the island. The point is surmounted by a peak called *Focinha de Cao* (Dog's Snout), which stands S.E., three-quarters of a mile from the point. From this the point slopes gently down to the sea, and terminates in a rocky islet, called *Pedra das Agulhas*, 2 cables off shore.

WEST BAY, or Bahia das Agulhas, which is bounded to the N.E. by Ponta Pedrinha, distant from Ponta das Agulhas 3 miles to N.E. by E. ½ E. is 1½ mile deep within this line. When seen from the West, this bay is very remarkable. In the foreground appear five points, which are like five conical islets, as the low land behind them does not show at first; behind these are the Bico do Papagaio, the Charrote, and O Pico; and to the right the peaked rock called Pedra das Agulhas, so that it well deserves the name of Bahia das Agulhas (the bay of needle-shaped peaks). It is sheltered from S.W. winds, and also perfectly so from the S.E. winds of the tornado season. It is clear of all danger, and the depths diminish gradually from 27 fathoms in its opening to 16 fathoms, sandy mud, a little to the East of Ponta das Agulhas.

The land at the bottom of the bay is low, and formed by hills separated by valleys, through which flow a great number of brooks, which furnish excellent water; one of the best of these is to the West of Roca Ferreira, a large house on a hill a little to the East of Punta das Agulhas. A rocky shoal here extends 2½ cables off shore. In 1874, the old fort and the house of Roca Ferreira were reported as not to be seen.

The English had a coal depôt in this bay, for their steam vessels on the African station, employed in the suppression of the slave trade. It is high water in the bay, on full and change, at $3^h 37^m$; springs rise 5 ft. 10 inches. Tempests frequently occur, in which, at times, the wind blows from the N.W., when it is necessary to look to the moorings; but in general there is no danger. The high lands attract rain; and it frequently happens here, as at the Bay of Santo Antonio, that it rains heavily and for a long time on the land, without a drop falling on the shipping afloat. Only a few negroes live here, and supplies of any kind cannot be obtained.

Ponta Pedrinha, in lat. 1° 38′ 20″ N., long. 7° 21′ 47″ E., falls into the sea in a rocky cliff; it is surmounted by a hill, the termination of the central chain. To the North of the point is a small bay with a sandy beach, the North point of which is worn through by the sea, and called *Ponta Furada* (pierced point). Beyond this the coast, still rocky, forms another bay, bounded by *Ponta da Broa Pequena* (Point of the Small Loaf), which is 1 mile N. ½ E. of the Furada. The coast throughout is clear, and with depths of 9 to 12 fathoms almost touching the shore. *Ponta da Mai-Martha*, two-thirds of a mile N.N.E. of the former, is the West point of a tolerably large bay, of which *Ponta Flora*, 1½ mile E. by N., is the East limit. It is clear of danger, and has good and safe anchorage; the only drawback being that common to all the bays of the island, that of gusts of wind and calms, caused by the mountains. At the bottom of the bay Mai-Martha is a house surrounded by some huts and numerous streams.

Pedras Tinhosas (scurfy rocks), or *Os Frades* (the Brothers), are two conspicuous islets to the S.W. of Ilha do Principe. The largest and highest, which is about 130 ft. in elevation, lies 12½ miles S.W. ¾ S. from Ponta Grossa. The other, which bears S.W. ¼ S. 10½ miles from the same point, is also high. They are covered with bushes on their summits. The large isle shows two paps when seen from East or West, and the smaller one is of a square form, and at its S.W. side is a large detached rock. They are both marked with white patches, caused by the dung of the sea birds. They are connected with Ilha do Principe by a bank of soundings, which is narrow at its South end, but widens to northward; the depths on it are considerable, from 30 to 50 fathoms, gravel, sand, and in some places rocky bottom.

Captain Fishbourne gives the following observations on Prince's Island, which he visited in December, 1841:– On leaving Clarence Cove (Fernando Po) for Isle Prince, or the South, you are recommended to steer to the eastward, leaving the islands to the West of you, but without sufficient reason. Although you avoid the current, you have to run to leeward a greater distance than the current could have carried you, and all which distance is to be made good against the current. If you are bound out of the Bight, or to any of the island, in steering for North-West Bay, Isle Prince, where we were bound to, allowance must be made for the easterly set of the current. A sailing vessel making it to the southward of E.S.E. had better stand on all night, or till she could weather the island, thus passing to the southward of it; but she should not, except under the most favourable circumstances, pass between the Dutchman's Cap and Isle Prince, as the winds there are baffling and the currents variable. In this way she may arrive early on the following day. I have known a vessel to have been three days beating up on the North side, which will surely follow if the master or captain is timid, as he will lose at night his daylight labour. The South side of the bay is to be avoided, as the ground is foul, till you get into 14 fathoms, where there is good anchorage, freest from rain, but at a long and inconvenient distance from the watering-place. Vessels may go into 8 fathoms without apprehension, bringing Madame Ferreira's house to bear about E.S.E.

The water here is excellent, and easily obtained in any quantity. The wood is plentiful, but the dark coloured, of great specific gravity, is entirely to be preferred. Beef may be obtained at Port St. Antonio; at times, pigs and poultry, but not in quantity. Guavas, sour-sops, papaws, limes, oranges, bananas, pines, and cocoa-nuts, are to be had here, but yams and sweet potatoes are very scarce; coffee is plentiful, and of excellent quality; cocoa-bean is good and cheap here.

A detailed account of the history and capabilities of this island, which, it may be supposed, exhausts the subject, will be found in the work before quoted, by José Joaquim Lopes de Lima (Ensaios sobre a statistica, &c.), in which all previous notices are incorporated and quoted. With an extract from that work we conclude:—"This island has no internal trade, as it has but one town; neither has it any practicable roads, beyond the Serra do Papagaio and the mountain Dos Picos, and up to these they are rather tracks than paths. The language spoken is the same mixed dialect, *Luso-Ethiope*, as is used at San Thomé, but differently accentuated, and more copious in the African words. The men of the better class are well educated, affable, courteous, and hospitable, speaking and writing Portuguese purely, and some of them acquainted with other European languages. The ladies also understand, read, and write Portuguese. The lower orders are rude, superstitious, and most indolent; they cordially detest their compatriots of San Thomé, who in turn look upon them with equal aversion."

ISLAND OF SAN THOMÉ.

The Island of San Thomé, or St. Thomas, is another Portuguese possession. It is very much larger than the Ilha do Principe, and of greater commercial importance; but it is less useful in a nautical view, on account of its want of harbours. Vessels not intending to anchor should not approach this island, as calms, baffling winds, and strong currents, prevail in its vicinity.

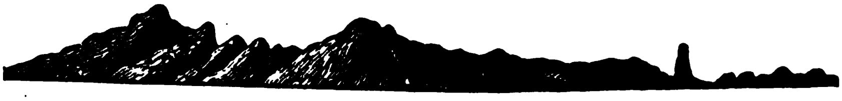
The date of its discovery, like that of the preceding island, is now lost in some obscurity, as before stated; but the great probability is that it was first seen by Joao de Santarem and Pero de Escobar, two noble Portuguese, who had Martinho Fernandez (of Lisbon), and Alvaro Esteves (of Lagos), as pilots. After discovering Cape Lopo Gonçalves (Cape Lopez), they saw this island on December 21st, 1470 (the feast of St. Thomas). As in the former description, we have drawn our information from the work of J. J. Lopes de Lima, where a full and interesting account of all the particulars of this island will be found. It was first colonized by Joao de Pavia, in virtue of a warrant from King Joao II., dated September 24th, 1485, which gave large privileges, and these were afterwards extended. Fostered by royal care, this island became the chief emporium of Portuguese colonial commerce; and cultivation, roads, villages, and public walks, added very greatly to the prosperity of its mercantile interests. The progress of its commerce, and the means by which it was fostered, are related by the historian, Torre de Tombo. One cause of the decline of the prosperity of this island, was the aggression of a body of *Angolares* (negroes of Angola), who had been wrecked in a slave ship on the Sete Pedras, and had lived and increased in the bush, and in the year 1574 made an attack on the unsuspecting inhabitants. The town of San Thomé was burnt in 1585; and the bush warfare was kept up against them, but they were not completely subdued till nearly a century afterwards. A chain of troubles, among which the attacks by pirates at different times, and the European wars, brought this island, from its once prosperous condition, to a state of ruin. But one of the chief causes of the desolation of San Thomé was the discovery and colonization of Brasil, the superior climate of which, combined with its immunity from the troubles just named, and its vast extent, soon attracted all the colonists of San Thomé thither, and it was left a wilderness, now slowly recovering. It is now a Portuguese penal settlement.

The Island of San Thomé is divided into eight freguezias, or parishes, two of which are in the town or city; these contained, in 1844, 1,432 fire hearths; of the population, 33 men and 14 women were white or mulattoes, all living in the town of San Thomé. Of free negroes, 2,851 men, 3,081 women; together, 5,932. Of slaves, 1,051 men, 1,139 women; together, 2,190; making a total of 8,169 inhabitants. In 1874 the population was said to amount to 18,000.

The Island of San Thomé is 25 miles long and 17½ miles broad, and is nearly all mountainous. In its central and western parts is a very high peak, called *Pico do San Thomé*, covered with a very dense mass of trees. Its peak is frequently covered with snow, and is 7,005 ft. above the level of the sea. At 2 miles S.E. of this is the peak of *Anna de Chaves*, 6,913 ft. high, and a little to the N.E. of this is another, equally high. From this central mass two chains diverge, one towards the E.S.E. to the Bay of Mecia Alves, and the other to S.E., having, among other peaks, those of *Maria Fernandez* and that of *Mocondom*, the last being close to the shore. From these last mountains the chain trends to the W. by S., terminating in the pointed peaks of *Cao Grande* and *Cao Pequena*. The North end of the island is an extensive plain, watered by a multitude of rivulets, with an undulating chain of hills near its central part.

The island, when seen from the N.N.E. at a distance of 60 miles, shows as three very conspicuous mountains—Pico do San Thomé, the summit of which is almost hidden by clouds: the Cao Grande, with its needle-shaped peak; and Maria Fernandez, the top of which is in the form of a sugar-loaf. It is 80 miles S.W. ½ W. from the Ilha do Principe, and this is also the general direction of the island itself. It possesses one of the most fertile soils that can be imagined, but labour is wanting for its cultivation. Its chief products for exportation are coffee and cocoa. The same description of fresh provisions and refreshments may be got here as at Ilha do Principe. In 1874 some small bullocks were obtained. The chief town is San Thomé, in the Bay of Anna de Chaves, on the N.E. part of the island, the name of the bay being frequently confused with that of the city. This bay, and that of Santa Catharina in the S.W. part, are the only good anchorages for vessels of any burthen.

The following view of St. Thomas's Island, 8 or 9 miles distant, was taken by Captain Sir George Young, and is presumed to be correct. The summit of the peak is generally covered with a cloud that appears like smoke.



E. by S. *S.E. ½ S.*

Ponta do Figo, the N.W. point of the island, is high, peaked, and cliffy. At 1½ mile E. by S. ½ S. of it is *Ponta Carregada*, low at its extremity, and surmounted by a conical hillock, called *Morro Carregado*. There are rocks extending off these points, some of which cover at high water. *Ponta d'Agoa Ambo* is 1½ mile E. by S. from the former point. (On the Portuguese chart the point is called Morro Peixe, while that so called by M. Kerhallet is without any name.) The shore between them is broken, and consists of black rocks. From this last point the coast trends S.E. by E. 1½ mile, to *Ponta do Peixe* (or *Ponta do Fernao Dias*), a rocky projecting cape, on which stands the *Morro do Peixe* and the ruined chapel of *San Francisco*. It is a good mark for the anchorage of Das Cabras, or Man-of-War Road.

Ilheo das Cabras is in lat. 0° 24′ 10″ N., long. 6° 41′ 31″ E., at 1½ mile E. ¾ S. from Ponta do Peixe, and situated on a bank which extends 2 miles off the coast. It consists of two hummocks on low land, and may be seen at 16 or 18 miles off. Man-of-War Road, or the *anchorage of Das Cabras*, lies between Ponta d'Agoa Ambo, to the West, and Ponta do Peixe, to the East. It is easily taken, and the northern coast of San Thomé is very pleasant in appearance, as is also the eastern side. A rich verdure covers the hills, and groups of fine trees are scattered over the plains.

Man-of-War Road, on the N.E. side of the island, is a fine spot for small vessels, but large ships are obliged to lie out in the open road, in from 10 to 18 fathoms, where there is good ground and smooth water; though it is dangerous lying there in the season of the tornadoes, as they prevail from the N.E. directly upon the shore.

It appears, from the Journal of Sir George Young, that being at Badagry, and observing in the evening a tornado coming on, they ran up as far as Whydah, and thence upon a stretch to St. Thomas's. The island was made in eight days, but four or five days more elapsed in getting round to the bay.

The marks for anchoring in 10 fathoms, sandy bottom, in *Man-of-War Road*, are, Ilheo das Cabras, or Goat Isle, making like a saddle, bearing S.E. ¼ S.; San Francisco, or Misericordia Chapel, seated on a hill, on with a black rock upon the shore, and bearing S. by W.; the white mansion house upon the shore, called Fernandilla House, S.W. ¼ W. From the latter, the watering-place is only a quarter of a mile to the eastward. From the above anchorage a remarkable hill will bear S.W. by W.; it is crowned with a clump of trees, and resembles a helmet or casque, and hence is called *O Capacete.*

The marks for the best anchorage for a large vessel in Man-of-War Road are, the middle of Ilha das Cabras, S.E. ½ E., the ruined chapel of San Francisco S. ¾ E., and Fernandillo Farmhouse S.W. by S. ½ S.—*Lieut. McFarlane, H.M.S. Boadicea*, 1881.

The watering is very easy here, from a fine, small, rapid river, called the *Rio do Ouro*, that vents itself into the sea, and which is a great deal better than the river at the town, where the women are for ever washing with nasty, stinking palm-oil soap. Plenty of wood is also to be obtained here. It is better to land, for watering, a little to the West of the river, as there is a strong surf on its bar.

Man-of-War Road is a preferable anchorage to that of Anna de Chaves, particularly in the tornado season; as the winds, which blow directly into the latter bay, lead clear out to sea from the former.

The water, also, is not only much better in the former, but is more easily obtained. Beef and other refreshments, except what may be brought on board by the canoes, must however be sent for to Anna de Chaves, the market place here being well and reasonably supplied with tropical fruits, vegetables, eggs, fish, poultry, pigs, goats, and sometimes cattle.

Close to the landing-place at Man-of-War Road is the large stone mansion belonging to the extensive estate of Fernandilla; and at three-quarters of a mile S.E. by E. of it, on the summit of an eminence of no great elevation, is the ruined brick church of San Francisco, before mentioned.

Ponta de Diogo Nunes, or, as it is called by M. Kerhallet, *Pta. de Vasconcellos*, is 2 miles S.E. by S. from Ponta do Peixe; it is low, and not easily made out when bearing West; to the northward of it a small river, *Ribeira de Diogo Nunes*, enters the sea. To the southward of the point is a small bay, called *Praya Lagarto*, or *Bahia de Vasconcellos*, from the name of the navigator said to have discovered the island; its shore is sandy, but it can only be used by small vessels. A small river, the *Rio de Melo*, enters its southern corner.

ANNA DE CHAVES BAY.—This, which is frequently but erroneously called the Bay of Santa Anna, lies between *Ponta de Anna de Chaves*, on which is a ruined fort, and that of San Sebastian, which bear from each other S.E. by S. ½ S. and N.W. by N. ½ N., 1⅓ mile apart. Both these points are rocky, and that of San Sebastian is very low. To the West of the points a fine beach of white sand, perfectly regular, surrounds the bay, at the bottom of which stands the chief town of the island, called the *Cidade de Sao Thomé*, and not *Santa Anna*, as it is erroneously called. The bay is perfectly free from all danger, and although it is open to East and N.E. winds, it offers (but only to small vessels) a safe and commodious anchorage. It is said to be gradually filling up. Those which draw above 16 ft. cannot enter sufficiently within the points to be quite sheltered, and are, consequently, forced to remain outside. The bottom, nevertheless, is excellent throughout.

A bank, commencing at Punta d'Agoa Ambo, extends off the N.E. part of the island, the limits of which are nearly marked by Ilha das Cabras, as the edge of it, in 3 fathoms, is half a mile East and North of it. From the eastern point its edge trends about S. ¾ W., so that it meets the shore at Pta. Sao Sebastiao, the South point of the bay. It is called the *Bank of Santa Anna*, and on it the depth varies from 2 to 3 fathoms, sand and shells. This is not the only bank which requires caution by large ships coming from the North to Anna de Chaves, or from the South to Man-of-War Road. There are two others, extending about 2 miles North and South; one of considerable extent, called the *Bank de Chaves*, with 3¼ fathoms on it, and does not show, may be passed to the southward by keeping Fort San José bearing West. The other bank, northward of it, is called *Bank do Pescador*, and is very small. It is separated by a narrow channel of 5 fathoms from the former one, and has a depth of 3¼ fathoms on it. Large ships must pass to the South of these to come to the Bay of Anna de Chaves; but as the anchorage for them is exposed, and during the tornadoes the strength of the ground tackle is the only safety, that of Man-of-War Road is preferable. Captain Kerhallet says that he anchored in a corvette drawing 13¾ ft. water, with Fort San Sebastiao bearing S.W. ¾ S., and Fort San José N.W. by W. ¾ W., in 5 fathoms, sandy bottom, at 1¼ mile from the city.

The City of San Thome', the capital of the island, stands at the head of the Bay of Anna de Chaves; it extends in the form of an arc for 1⅓ mile along the shore, and is half a mile in breadth. Its appearance is pleasing and picturesque; the streets are wide and well laid out. The town includes about 900 houses, built of wood, and roofed with tiles, for the most part. Some of them are large, but nearly all have a wretched appearance.

There are several churches built of stone; among others, the cathedral (A Sé) la Conceiçao and La Misericordia; there is also the civil prison, the town hall (Casa de Camara); and the custom-house, a large building on the edge of the Rio de Agoa Grande to the West of the city. In front of the custom-house they have commenced a quay, which remains unfinished for want of funds. Outside the city, on a hill, is the chapel of the Madre de Dios. In the town are shops, very poor in appearance, but well kept, where furniture, eatables, wine, &c., are sold, imported by European vessels, and chiefly by Americans. A market is held every day in the town, where provisions of most kinds are to be got. Bullocks may be also got by applying to the merchants. Horses, donkeys, and excellent mules are also to be procured. To the South of the city is a large marsh, which becomes a lake during the rainy season. Two others also exist, one to the S.W., and the other to the West. These render a residence at St. Thomé extremely unhealthy during all seasons of the year. The water of the Rio de Agua Grande, near the custom-house, is excellent; it is very light and agreeable, but polluted by washing near the entrance. There is some difficulty in boats entering the river on account of its shallowness; near the entrance it is crossed by a rude bridge, constructed, in 1850, of simple trunks of trees. The population of the two parishes of San Thomé was 4,475, including the whole white and mulatto population of the island. The Portuguese mail steamer from Lisbon calls here once a month.

Fort San Sebastian Light.—The fort, a prominent white object, stands near the extremity of Ponta San Sebastiao, and from an elevation of 35 ft. above the sea is exhibited a *fixed bright* light, which should be seen in clear weather from a distance of 4 miles.

It is high water, on full and change, in Anna de Chaves Bay, at $3^{h}\ 25^{m}$; springs rise 4 ft. 7 inches. The tides are regular, but the currents are weak and irregular outside the bay, frequently setting to the North and N.N.E.*

"The country in the vicinity of Anna de Chaves bears convincing proofs of the exuberant fertility of the soil, and the carpet of verdure, enamelled by the exquisite bloom of countless plants, truly announces with what a munificent hand nature has distributed her treasures in the favoured localities of these sunny islands. The edible fruits and vegetables, reared in the vicinity of the town, are chiefly those which custom and a long established requisition has plentifully called into cultivation. It is, therefore, in conformity with these objects that the mandioca, or sweet cassada (*jatropha janipha*), is so universally planted for the manufacture of farinha; inasmuch as it not only supplies their domestic wants, but is a valuable article of commerce. It is transmitted to the other Portuguese possessions in Southern Africa, where, from the aridity of the land and dearth of rain, its production is often a matter of difficulty. The African bean, or callavancy, is another useful product, held in much request by the foreign shipping, and is generally purchased to promote the health of the crews. Limes, melons, oranges, yams, plantains, sweet potatoes, cabbages, pineapples, papaws, maize, peppers, and indeed nearly all the vegetable esculents found in Western Africa, are readily bartered for old and worn out apparel in preference to either money or spirits; and this mode of payment equally applies to the Islands of Prince's and Anno Bom, the natives of which are always desirous of receiving such habiliments in exchange for their produce, which is, perhaps, more in concurrence with their taste and vanity for dress. Beef, pork, mutton, goats, poultry, turtle, and fish, may be found, more or less, in the market, the price of the former being regulated by the quantity required by the vessel; it, however, cannot be procured at the same moderate rate demanded in other parts of the Bight.*

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* Captain Fishbourne, R.N., on arriving at Anna de Chaves (December, 1841), found it to be very shoal, as if filling up. "Wood and water were very scarce. We failed in obtaining stock, of which, they said, there was plenty, but to be had only by sending into the country. The extreme wretchedness of the town offered too much confirmation of this, to induce us to stop and make the experiment. Some remains still appear of the short-lived wealth and questionable prosperity during the palmy days of kidnapping. Although the soil is so rich, we could obtain but a few miserable vegetables, that were not worth carrying. Sugar and coffee were exported to a tolerable extent formerly, but the planter has emigrated to the Brasils."

Sao Sebastiao Point, the South limit of the bay, and on which stands the fort, or *Fortaleza de Sao Sebastiao*, is in lat. 0° 20′ 30″ N., long. 6° 42′ 38″ E. At 1 mile S. ½ W. from the fort St. Sebastiao is the ruined *Fort de Sao Jeronimo*, on a small richly wooded eminence. A large watercourse enters the sea at three-quarters of a mile S.S.W. of this. *Ponta do Prayao* is of moderate height, and projects two-thirds of a mile beyond the line of coast. Beyond this the land rises rapidly, and at 1 mile from the point is a conical hill, which is 3½ miles S. by W. ¼ W. of Fort Sao Sebastiao, the coast between being fringed with rocks. The coast S.W. by S. of this is much broken up, and within the space of 3½ miles forms two bays, or rather one larger bay separated into two by a rocky point. This indentation is called by the French Manuel the Bay of Mecia Alves, a name applied by the Portuguese to a smaller bay to the South of it. These two bays in question being named *Praya do Almaxarim* and *Enseada de Santa Anna*. These two bays are rocky; those in the northern bay cover and uncover. In the centre of the southern one the chapel of Santa Anna is seen.

Ponta dos Angolares,† 4 miles S.W. by S. of Ponta do Prayao, is of medium height, and terminates in cliffs toward the South. On its extremity a single palm tree, and some separate clumps of trees, will be seen. The *Ilheo de Santa Anna* (or *Postilion's Cap*), in lat. 0° 14′ 10″ N., long. 6° 44′ 7″ E., is a mile off the preceding point to E. by N. It has a rocky base, moderately high, and covered with bushes on its summit, and may be seen 16 miles off. There is a passage inside it, but it would be imprudent to use it. Off this part of the coast the bank of soundings extends about 3 miles.

The Bay of Mecia Alves, to the South of Ponta dos Angolares, is called by the same name as that point by M. Kerhallet, but by J. J. Lopes de Lima is termed as above. It is a small sandy cove of four-fifths of a mile in extent. Its beach is intersected by three streams, of which those to the North and South are important watercourses. There are some houses near it, but it has no shelter.

At 5 miles S.W. by W. ¼ W. of Ponta dos Angolares is a rock called *Pedra Furada* (or pierced rock), which lies near the shore; and three-quarters of a mile beyond this is the *Pico Mocondom*, close to the shore. It is the termination of the chain, which is connected with the central group of mountains, and hence turns to the W.S.W. To the North of it the *Agoa Izo*, a small stream, reaches the sea; and, to the South of it, is a small indentation called *Angra Toldo*.

Ponta de Santa Maria, called by J. J. Lopes de Lima, *Ponta dos Morcegos* (Bat Point), is 9 miles S.W. by W. of Ponta dos Angolares, and consists of cliffs, surmounted by a conical hill. To the West of it is the mouth of a small river. *Ponta Fernando Diaz*, or *Ponta Agoa*, is 3½ miles W. by S. ½ S. of Ponta Santa Maria; and 1½ mile W. ½ N. of this is *Ponta Aguili*, which is high, rocky, and slightly projecting. A reef extends off it one-third of a mile, the outer rock of which is blackish, and named *Agulli Rock*. This point is the N.E. point of *Praia de Lança*,* or *Angra de Sao Joao*, a semi-circular bay of about 1 mile in its opening. Its shore is rocky throughout, and three rivers fall into it. At the West part of the bay is the village of the same name. The coast here is very abrupt, formed by the slopes from the Pico do Cao Grande (Great Dog Peak), which rises about 2½ miles North of the bay. The anchorage in the bay offers no security.

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* Dr. W. F. Daniell, "Medical Topography," &c., pp. 173, 174.

† This is the name given by the inhabitants to the parish or Freguezia of Santa Cruz, which is on the northern slope of the Pico de Maria Fernandes. The village of Santa Cruz stands on the summit of a mountain.—*M Kerhallet.*

The S.W. point of Sao Joao Bay is *Ponta Diego Nunes*, or *Sao Joao*, having many sunken rocks at its foot, and is surmounted by the *Pico Macuru*. *Ponta Preta* (Black Point), or *Ponta do Ilheo Grande*, is 1¼ mile S.W. ¼ S. of the former, and is the West point of a narrow but deep bay, called *Bahia de Pramanga*, which, being open to the S.E. winds, is only used by small coasters of the island. *Ponta Pramanga*, its S.W. point, is a large rocky point, with a hill on it close to the sea. Above the cliffs is a flat-topped hill, on which stands the village of *Santa Catharina*.

As Sete Pedras (the Seven Stones) a reef about half a mile in diameter, lies 3⅜ miles E. by S. ½ S. of Ponta Preta. The largest and highest of these rocks are in the centre of the group, which by day is not dangerous, but by night requiring great caution, as it is very steep-to. It stands very near the edge of the bank of soundings. The passage between them and the coast varies in depth from 22 to 30 fathoms.

Ponta da Balea, the South point of the island, and 1⅓ mile W. by S. ½ S. from Ponta Pramanga, is in lat. 0° 0′ 45″ N., long. 6° 29′ 42″ E. It is pointed, rocky, and surmounted by a small conical peak.

ILHA DAS ROLAS is the largest of those surrounding Sao Thomé, being 1⅛ mile N.E. and S.W., and nine-tenths of a mile N.W. and S.E. It is high, covered with large trees, among which are some cocoa-nuts, and has at its North part a small conical hill. As seen from a distance, it shows as two islets. The island is remarkably placed, as the Equator crosses its North end. The only landing is on the North side, in a valley, near which are two springs, which are connected with the sea in some way, as they ebb and flow with the tide. The island is, or was, inhabited by a single individual; and poultry, pigs, and goats, may be got. A vast number of turtle doves (*rolas*) live in the woods, and give name to the island. The channel between it and the coast is 1 mile broad, and safe, with from 7 to 10 fathoms.

There is good anchorage in this channel to the N.W. of the Ilheo das Rolas, in 5½ to 4½ fathoms, with the summit bearing S.E. at two-thirds of a mile distance; and here is shelter against the S.E. winds during the tornadoes. In any case, should the vessel drive, she can get out to sea; but the anchorage is not good for South and S.W. winds, which generally make a heavy swell.†

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* It may be again observed that these names, as given by M. Kerhallet, do not accord with those applied by J. J. Lopes de Lima, but they are both given here.

† Captain Fishbourne says, "The anchorage between Ilha das Rolas and St. Thomas, in 6 fathoms, where we stopped after leaving Anna de Chaves, is well sheltered and convenient for wooding; but water can alone be got from Isle St. Thomas opposite, and there in any quantity, and very good. We obtained a small supply of pigs, poultry, turtle, and

The *Bay of Santa Catharina*, which lies to the northward of Ponta da Balea, and is a curve 2 miles in extent, is named from the village. There is no fresh water in the bay. The North point of it is called by M. Kerhallet Santa Catharina; by Sen. de Lima, *Ponta do Homem da Capa*, and consists of high cliffs. At a mile to the West (*true*) of it, according to the latter authority, is a reef called *Balza do Flamengo*. *Ilheo Macaco* (Monkey Island), a high rock close to the shore, is 2¼ miles northward, and lies in a line with the two peaks of Cao Grande and Cao Pequeno. There are two other peaks above the cliffs, called *Pico de Praya Lança*, and *Pico da Preta*. Near the island are some fishermen's huts. The bay to the southward of it is called *Praya Grande do Calaboyo*, and that to the northward *Praya da Preta*. or *Praya Lança*.

Ponta Gabado, 3¼ miles N.N.W. of Macaco Island, with Pillar Point midway between, is formed of cliffs, and is remarkable for three rocky islets, equally high, near it. The southern and largest is called *Ilheo de S. Miguel;* that to the S.E. is *Ilheo Gabado;* and the North is *Ilheo Formoso;* the two largest are covered with bushes. The *Morro de Souza*, a small hill standing above the sea, is 3¼ miles N. ¾ E. of Ilheo Formoso, and recognisable also by a small low, rocky island, *Ilheo de Joanna de Souza*, close to the coast. A reef is marked on the Portuguese charts as extending southward from the point. *Ilheo Venangelo* is three-quarters of a mile beyond the last island, and is high and wedge-shaped.

Ponta Furada, formed of low perpendicular cliffs, pierced by the sea, is the West point of the island, in lat. 0° 13′ 50″ N., long. 6° 25′ 49″ E. *Ponta Alemao* is 2 miles beyond this to the N.E., and is the South limit of a shallow bay called *Enseada de Santa Catharina*, the North limit of which is *Ponta Diogo Vas*, 3 miles beyond, and fringed with rocks. The coast here rises rapidly towards the *Pico de Sao Thomé* and the central chain of the island. From the last named point to Ponta Figo, the N.W. point of S. Thomé, the distance is 8¾ miles E. by N. ½ N.; the only projection noticeable is the *Ponta das Neves*, the West point of *Conchas Bay*, and with a small village and chapel on it.

The whole of the West coast has been but little examined or frequented, and ought to be avoided, especially during calms. The coast is mostly composed of cliffs, in places fringed with rocks. It has very few inhabitants.

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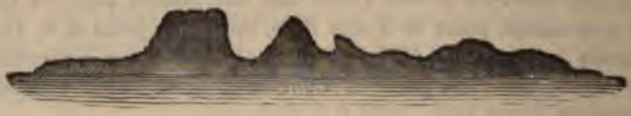
fish, every day. The officers succeeded in shooting a considerable number of wood pigeons and doves, which proved a grateful addition to the sick men's mess.

"The bay opposite, in St. Thomas's, is far from being a desirable anchorage, even a steamer, without coal, will find a difficulty in coming out at times: green wood giving a very insufficient quantity of steam to make head against the cross sea which generally prevails here"

ANNO BOM.

ANNO BOM, or **Anno Bona**, is a beautiful little island, in lat. 1° 25′ S., long. 5° 36′ E., 100 miles S.W. ½ W. from St. Thomas Island. It is inhabited wholly by blacks, who formerly considered themselves subjects of Portugal, but the island is now claimed as a possession of Spain. The island is of a conical form; and around the base of the mountains, next the sea, is a narrow margin, about a quarter of a mile in breadth, which is covered with groves of cocoa-nut and plaintain: the cone itself is beautifully wooded to the summit. The natives appear simple and inoffensive, and obtain their subsistence chiefly from the sea. The town is prettily situated on the margin of an open bay on the N.E. side, in a grove of cocoa-nut trees, and may contain 400 or 500 inhabitants.

The island is 4¼ miles long North and South; its greatest breadth is 1⅝ mile, and its least breadth three-quarters of a mile. It is not irregular in its figure but resembles Fernando Po in this respect. It is, in reality, but a mountain, which rises abruptly from the shore into three chief summits, the highest of which to the North, called the Peak *Do Fogo*, is 3,250 ft. high. It is a truncated pyramid, the top being a narrow ledge, not more that 35 ft. long, and wooded four-fifths of its height. At its foot, to the W.N.W., is a small, shallow lake of fresh water, nearly 2 miles in circumference. At two-thirds of the length of the island from the North rises the Peak *Do Centro*, and a little to the South of it that of *Dos Sulcados* (furrows), so called from its appearance.



Anno Bom, W.S.W. 36 miles, as seen by Captain James Wallace Monteath.

The island was probably first discovered by Joao de Santarem and Pero de Escobar, on January 1, 1471, and was named Anno Bom, or *Good Year Island*, from being first descried on a New Year's Day. Its central land is so high, that it may seen, in clear weather, at the distance of 30 to 35 miles; and its shores may be approached with safety, in any direction, so near as a mile. Its base, where it emerges from the sea, is about 30 miles in circumference; from which the land rises, in varied and picturesque forms to a considerable elevation in the central parts of the island, nearly the whole of which is covered with orange and lime trees; and on the summit of the sugar-loaf mountain there is a pond of fresh water. The anchoring place is on the N.E. side of the island, where there is a town near to the shore, defended by a small intrenchment of stones; abreast of which, and about half or three-quarters of a mile from the beach, there is from 10 to 15 fathoms of water, good sandy holding ground, very smooth riding, and a convenient landing-place. On the S.E. side of the island there is good fresh water, which runs down the mountain through a valley of orange trees; but the watering is rendered somewhat difficult by stones and breakers.

The wind about the island blows with a moderate force, and little variation, from the South and S.W. quarter, throughout the year; so that, as ships lie there under shelter of the land, they ride at anchor exceedingly easy and safe, and the navigator has little or no danger to apprehend from wind and weather, excepting about the months of March and September, when tornadoes, or strong gusts of wind from the eastward, prevail at times over the general sea breeze, and blow direct into the anchorage; but, fortunately, the previous gloominess of the horizon to the eastward, and the heavy thunder and lightning by which they are preceded, always give timely notice to those who have not the ground tackling requisite for riding them out, to get under sail, and withstand their fury in the offing.

In point of salubrity to European visitants, this island could scarcely fail of proving superior to any of our settlements on the western coast of Africa, and it is much better suited to the constitution of Europeans than the climate of any other African island, situated within the tropics, and at a shorter distance from the continent. It is situated far out of the reach of those pestilential vapours and excessively heavy dews and rains which are so prevalent, and so fatal to Europeans, on the coast of the continent; and it does not contain any marshy land, nor stagnant water, within its shores.

The island produces plenty of wood, suitable for firing, and is well supplied with pure fresh water, which flows into the sea at a short distance to the S.E. of the anchorage; and ships may soon procure a supply, either by means of their own boats and people, or by employing the canoes of the natives. It also produces plenty of refreshments, and very cheap, but they cannot always be depended on. There are cows, sheep, goats, fowls, and many hogs; together with sugar-canes, plantains, bananas, pineapples, cocoa-nuts, pomegranates, oranges, limes, tamarinds, yams, and cassada. But oranges are the fruit with which the island mostly abounds; the quantity of them is incredible, and they may be obtained all the year round; they are full of juice, and of an exquisite flavour. A little cotton likewise grows on the island, which is sent to Portugal. By properly encouraging the natives, they might doubtless be very soon brought to supply any quantity of those and other refreshments that ships might need; and should anything else be required, such as bullocks, rice, Indian corn, calavancies, and yams, or even ships timber and lumber, the island could be readily and abundantly stocked from the neighbouring continent.

There are about 2,500 inhabitants on the island, who are a mixture of Portuguese and African negroes; the latter people are said to be descendants of a cargo of negro slaves, who were shipwrecked there on their passage to Brasil. They are, on the whole, a stout, hardy, active, and half civilised people, capable of becoming, under a liberal establishment, industrious, useful, and orderly subjects. Even in their present state of degradation and wretchedness, they may be found extremely useful to ships touching here; for besides fetching them wood and water, should any ship be in distress, through sickness or mortality of her crew, assistance from these people may be obtained on very reasonable terms; and many of them are not only

[illegible]

[illegible]

[illegible] a mile S.E. [illegible] the village of San Antonio [illegible] The houses are [illegible] a large number of black [illegible]

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* [illegible] daily fevers are at times [illegible] dangerous [illegible] predictions of [illegible] a most wretched [illegible] in one way, but [illegible] with the disease, that this descrip- [illegible] anchoring is [illegible] dangerous. It is clear, [illegible] plantains and other refreshments, [illegible]

† [illegible] Description of the Island, showing [illegible] with an Appendix on the [illegible] employed in the African [illegible] This little work is well entitled to [illegible] which may visit St. Thomas's or [illegible] sterling, for custom and [illegible] per cent. on all goods that are landed. The air [illegible] to strangers.

Between San Antonio and Passage Points, the shore is fringed by a shallow bank, extending in some places 2 cables off. The best anchorage, which must be approached with caution, is to the N.E. of the town, from half to three-quarters of a mile off shore, in 10 to 15 fathoms, sand, which forms a good holding ground; from this position Turtle Island bears S.E. ½ S., and Do Fogo Peak, S.W. by S. ½ S. There is also anchorage in 6 or 8 fathoms with Turtle Island E. ½ S., and Passage Rock S.S.E. This position is near the watering-place, whence excellent water may be obtained, but only by leading a long hose from a force pump through the surf to the boat. The anchorage off Anno Bom is not good, as the bottom is generally rocky, and a heavy swell occasionally sets in. It is high water, on full and change, at $3^h\ 45^m$; springs rise 5 feet.

Ponta Pedrinha, a rocky cliff, is half a mile S.E. by S. ½ S. of Pyramid Rock; and at one-third of a mile S. by E. from it is *Punta d'Agoa*, near which is a rivulet of very difficult access. At 4 cables S.S.E. of Punta d'Agoa is *Passage Point*, rising almost perpendicularly to a mount with needle-shaped rocks on its rocky face. At 4¼ cables N.E. by E. of Passage Point is a small, low, flat rock, called *Passage Rock*, the channel between this and the shore, and *Turtle Island*, 3 cables to the N.E., having 6 and 7 fathoms water. Turtle Island, or *Ilheo da Tartaruga*, of very singular form, is about a quarter of a mile in extent, and lies near the edge of soundings, in lat. 1° 23′ 18″ S., long. 5° 38′ 10″ E.

From Passage Point the coast trends in a moderately straight line, 2¼ miles S. by W. ¼ W. to *Ponta Martinho*, with a village and a rocky point between. Thence to *South Point*, the shore trends about a mile S.W. by S., with the village of San Juan in the northern of two small bays, and that of San Pedro above the point. *Lagos Point*, nearly a mile W. by N. of South Point, has a reef of rocks extending 2 or 3 cables off it. All the West coast of Anno Bom, from Lagos Point to Point Esteves, 4 miles to N. ¼ W., is safe and steep-to, but affords no shelter to shipping.

About 4 cables S.E. by S. ½ S. from South Point, is *Adams Islet*, small and rocky, presenting two heads when viewed from the East or West. About S.W. by S., between 1 and 1½ mile distant from Lagos Point, are three small islets or rocks named *Santorem*, *Escobar*, and *Fernando Po*, after the three navigators who discovered the islands in the Bight of Biafra; these rocks are visible from a distance of 18 miles. The locality has not yet been sounded over, but it is presumed that, like the coasts of the isle, these rocks are steep-to.

The *Currents* around Anno Bom are very variable; nevertheless, the island seems to lie in the Equatorial Current, which, to the West of the island, runs to W.N.W. with varying rate. In April and June it runs from 15 to 24 miles in the twenty-four hours. To the South of the island they sometimes run to W.N.W.; at others, North and N.N.W., and even N.N.E. To the East of the island they are often running to North, N.N.E., and even N.E. Hence it may be said that, during calms, the anchorages of this island are difficult to make. To the North and West of Anno Bom the Equatorial Current is almost constant.

SECTION VIII.

THE WESTERN COAST OF AFRICA FROM CAPE LOPEZ TO THE CAPE OF GOOD HOPE.

1.—SEASONS, ETC.

The seasons, etc., of Congo are briefly described by Lieutenant Bold at a previous page; and as every information is desirable on a coast so little known as that under consideration, the following observations, by Captain H. J. Matson, R.N., will be acceptable.

Seasons.—On the West coast of Africa, South of the Equator, the rains generally begin early in November, and continue until the middle of April. They are earlier on the coasts of Angola and Benguela, and later to the northward of Congo. To the southward of 15° S. there is occasionally not any rain whatever for several years; but sometimes in the months of November and December it falls in excessive quantities, and the country then becomes in parts almost inundated. There was not any rain near Benguela during the years 1839, 40, and 41; but the appearance of immense watercourses, in which were large trees that must have been carried by the torrents for many miles from the interior, amply corroborates this statement.

One general remark to be made on the seasons of this portion of the coast is that the more you advance southward the more backward they are.

Every time the sun in its alternate passage from one hemisphere to the other, is in the zenith of a place, this period is generally that of the bad season, of rains, and squalls, and storms. In places near the Equator, these passages happening every six months, there may be reckoned two rainy seasons and two dry seasons: the former, when the sun is in the zenith of the place; the latter, when it is at its greatest distance from the Equator, North or South. But this rule is not to be considered absolute, for in the parts near the Equator, what may be called the dry season is that in which the rains are not heavy or continual, and that in which you are subject to storms and tornadoes has its intervals of fine weather.

About Kabenda and Malemba (lat. 5° 30′ S.), the rains are very heavy from the beginning of December until the middle of January. To the southward of 10° S. the months of January and February are very fine, but oppressively hot and sultry.

The months of March and April are the most unhealthy. This is owing to the exhalations from the earth after the heavy rains, which the light sea breezes are not sufficient to dispel.

From May to September are the most pleasant and healthy months; the sky at this time is generally overcast or cloudy; in the months of June, July, and August, a thick fog (called the "smokes") prevails; it is not caused by exhalations, and is neither unwholesome nor unpleasant. Tornadoes occur in September and October; they gradually blow from S.E., and are not nearly so violent as those to the northward of the Equator, nor are they usually accompanied with heavy rains.

Winds.—From Cape Voltas to Cape Negro the wind blows constantly from South, a double-reefed topsail breeze. From Cape Negro to Salinas it continues to blow up the coast from S.S.W.; it becomes more moderate as you get to the northward, and when to the northward of Cape Mary it frequently blows from S.W. and W.S.W.

Between Salinas and the River Congo the prevailing winds are S.W. throughout the year. The sea breeze generally sets in about 1 p.m. from W.S.W.; it gradually veers to the southward, and continues to blow from S.S.W. or South during the greater part of the night, and becomes very light or calm before daylight. When within 10 or 15 miles of the shore, the land breeze will reach you, and continue some time, from sunrise until 8 or 9 a.m.; but if 30 or 40 miles off shore, you will generally have a calm from sunrise until noon. The sea breeze occasionally sets in from W.N.W. and N.W.; and this happens more frequently in the months of October, November, and December. During the "smokes" (in June, July, and August), the winds are very light, and blow from South and S.S.E. during the whole twenty-four hours.

At the distance of 80 or 100 miles off shore, the S.W. winds become more regular; they gradually veer round to the southward and eastward, and imperceptibly unite with the S.E. trade. A line drawn from the Tropic of Capricorn, in long. 5° E., to the meridian of Greenwich, in lat. 5° S., may be considered as the eastern limit of the S.E. trade.

From the River Congo to Cape Lopez the land and sea breezes are not so regular. From October to April the winds here are always constantly from S.S.W. and S.W.; and heavy squalls from S.W. and West occur in December and January. From May to September the land and sea breezes are more regular; the latter at this time often set in from W.N.W., and blow during the night from S.W. and S.S.W.; and then the land breeze is only felt close to shore.

Currents.—A current is almost constantly running up the coast of Africa from the Cape of Good Hope to the River Congo, at the average rate of 1 mile per hour. It is here met by the impetuous stream of that river, which runs with undeviating regularity to the N.W. and N.N.W. at the rate of from 2 to 4 miles in the hour, until it unites with the Equatorial Current 2° or 3° South of the Equator. The stream of the Congo is felt at the distance of 300 miles from its entrance, and may be known by the clayey appearance of its waters, which are of a yellowish olive green colour. From May to October the current occasionally runs to the southward, *close to the shore*, and continues to do so for forty-eight hours.

Rollers or Caléma.—A day or two after the new moon, in the months from May to September, a very heavy swell sometimes sets in along the whole coast from 3° to 15° S.; this occurs more frequently during the smokes. It renders the open bays very dangerous to remain at anchor in, where the water is very shallow. At this time it is nearly a calm, never more than a very light breeze; you can easily warp outside of the heavier rollers by a small kedge; or you can ride by a kedge anchor and hawser, when the chain cable would snap with jerks, caused by the sudden flow of a large body of water into the bay. During the period of rollers you cannot land on the coast, except in the surf-boats.

BANK OF SOUNDINGS.—From Cape Lopez the boundary line of the bank of soundings, i.e., where there is 55 fathoms (100 metres), gradually becomes more distant from the shore, as you go southward, as far as the right bank of the mouth of the River Congo. Off Cape Lopez it is about 8 or 9 miles out, and these deep soundings may be found close to the Cape and to the West of it.

Near the River Fernand Vaz it extends much farther, and attains a breadth of 25 or 30 miles, which it keeps as far as Point Sta. Catharina. From this point the line of soundings of 55 fathoms (100 metres) recedes from the coast, and on the parallel of Pt. Pedras it is 40 miles out.

The coast from Point Pedras runs to the S.E., and it seems that the boundary line of the bank runs parallel with it, until, off the Bay of Loango, 55 fathoms is found 50 or 55 miles out.

The prevailing nature of the bank is of mud near the shore, as far as 10 or 11 fathoms; farther out is found gray or muddy sand, sometimes sand and gravel, and sand mixed with coral. This last kind of bottom is found more in the neighbourhood of the River Congo. It is only in some places, as near Point Pedras, that the bottom is rocky. The rocks are always a short distance from the coast, to which a good berth should always be given when you come upon this kind of bottom.

Throughout the whole extent of the bank of soundings the water shoals very gradually from the West towards the shore. We have stated elsewhere the law which seems to regulate this, and which renders the navigation safe. Vessels can generally coast along 3 miles from land without fear of danger. Moreover, you can anchor on it anywhere, in any depth you choose.

The previous remarks will readily suggest what course you should take when sailing along this coast from North to South. So that, except when it is setting to the S.W., you should invariably keep out to sea beyond the influence of the current, and not come near the shore, except to take advantage of the land breezes which begin to blow about sunrise, or a few hours before. In a word, your must shape your course just as in the case of the Senegambia coast, when running to the North in the fine season.

The land breezes are usually not very strong, and are not felt more than 20 or 25 miles out.

The tornadoes on the Loango Coast are not so violent as those in the Gulf of Biafra or the Gulf of Guinea. They are usually violent storms, during which the winds blow from the East or S.E., and then gradually losing their force, recommence blowing from S.W., turning by the South. But still there are sometimes hurricanes from the East and S.E., of considerable violence, which compel you to take in all sail. But these squalls and storms are invariably so long gathering in the East and S.E., that you have plenty of time to prepare for them. It is about the parallel of the River Congo that these tornadoes cease to be felt

After this the navigation of the Loango Coast is found not to be dangerous, and it is very easy when sailing from South to North; only, in making the bays on this coast, you should always keep clear of the S.W. headlands of these bays, which are almost all skirted by banks of black rocks, although the points themselves appear to be of sand, which is probably only a covering on the surface.

On the whole of the coast we have been describing, except in the bays where landing is very easy, communication with the land is very difficult, and frequently very dangerous and impracticable for small boats, on account of the heavy surf which breaks upon the beach. It is therefore very useful to have here, as well as North of the Equator, some canoes or boats on purpose to clear these breakers, manned by blacks accustomed to manage them.

On the coast of Loango, as we have said, the alternations of the land and sea breezes are not very regular, except during the months of May, June, July, August, and September. In the other months the prevalent breeze from West to South varies very little from this direction.

In the season of the *rollers*, and especially at the period of the syzigies, you should avoid anchoring in shoal water, or if you do, be prepared to get away from the land at the first indication of danger. The rollers announce themselves by considerable surf; the sea breaks on the headlands of the bays before you perceive any swell inside; and from the mast-head there may be seen large waves out at sea occasioned by them, which look like ridges on the surface of the water.

II.—COAST FROM CAPE LOPEZ TO THE RIVER CONGO.

CAPE LOPEZ, or Lopo Gonçalves, the point of which is given as in lat. 0° 36′ S., long. 8° 43′ E., has been described in the preceding section. Between this point and what is called by Owen the outlet of the *River Mexias*, 21 miles to the southward, the coast is altogether clean, and you may sail along it, without fear, in 7, 6, and 5 fathoms water. The anchoring-place, off the entrance of the river, is in 5, 4, and 3 fathoms; but you have to avoid a reef, which stretches from the South point half-way over the channel. The river does not appear fit for ships. From the River Mexias to that of Fernand Vaz the course and distance are S. ½ E., 22 miles.

The RIVER FERNAND VAZ, in its lower course, forms the southern portion of the delta of the great River Ogobai, previously mentioned, and runs parallel with the coast for at least 35 miles. Until the publication of M. P. B. Du Chaillu's interesting travels, it was but little known to the rest of the world. But the exploits of that intrepid traveller, and also his having discovered here and first made known to science the habits and true character of the *gorilla*, the nearest approach to man in the animal creation, have invested this locality with a far greater interest than its commercial importance would give it.*

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* M. Paul B. Du Chaillu had resided with his father for several years on the Gaboon, and in this region, and on his return to America and Europe published a most interesting

The river and the low land hereabout are very changeable, so that no specific description will be long correct.

M. Du Chaillu, on arriving here on his second journey, October 8, 1863, says:—

The part of the African coast in the neighbourhood of the mouth of the Fernand Vaz has a monotonous aspect as viewed from the sea. A long line of country, elevated only a few feet above the sea-level, stretches away towards the South, diversified here and there by groups of trees, and enlivened only at intervals of a few miles by a cluster of palm-clad huts of the natives, amongst which is always conspicuous the big house which the villagers construct for the "factory" that they are always expecting to be established at their village. The mouth of the river itself is very difficult to discover. In my former journey it was recognizable only by the white surf which foamed over its bar, and by the flocks of fish-eating birds hovering in the air above it. The bar, however, seemed now to have shifted, for we passed by it without perceiving it.

Although I had been absent only four years—years so full of events to me! —time had wrought great changes in the scene of my former adventures. The mouth of the river had altered so much, that I scarcely knew it again. The long, sandy, reed-covered spit, which formerly projected 3 miles from the southern point of the river's mouth, had disappeared, and the sea had washed up the sand so much on the northern side that the village of Elindé, whose chief, Sangala, had given me so much trouble in former times, had become untenantable, and the people had removed. Many little islands had also been submerged or washed away, and I no longer saw those flocks of sea birds which formerly frequented the locality. Paddling up the stream we came to my own settlement, which I had called Washington; it was deserted and in ruins; a few loose bamboos and rotting poles alone remained to show me where it stood.

In 1863 Lieut. Carpentier, of the French Marine, in the *Arabe*, entered and ascended the stream, making a slight survey of it, but, as has been before remarked this can be of little permanent service. The following extract from his report will suffice:—

The coast is entirely formed of mangroves, and is so uniform that it is impossible to perceive any indication of the entrance from the offing. When within a mile, and in depths of less than 4 fathoms, the northern entrance, in lat. 1° 15′ S., may be made out. The North point is a moderately high sandbank and may be doubled to the southward at 600 yards in a depth of 12 ft., the least water found by Lieut. Carpentier in January, 1862. When abreast of the breakers on the South point, on which are some lofty trees with white

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account of the country, and especially of the Gorilla, the gigantic ape of which almost nothing but vague report had reached the *savans* of Europe. This work, "Explorations and Adventures in Equatorial Africa, London, 1861," excited some controversy in the scientific world, as is well known. This led the brave traveller to venture again into the same field. The expedition was accidentally brought to an abrupt termination, and the results are embodied in his second work, "A Journey to Ashango Land," 1867. This has fully established the fame and credit of the author. In addition to these works, that of Mr. W. Winwoode Reade, entitled "Savage Africa," will be read with great interest.

trunks, bear round to the South, keeping on the East shore, and the depth will increase immediately. As soon as the South breakers bear West, you can keep the middle of the stream safely. With care, it may be followed for about 5½ miles to the southward, when a second entrance will be reached. This has but 6 ft. at low water, and here the river itself is barred with only that depth in the passage, so that any vessel of greater draught will have to await the rising tide.

From this second bar to the entrance of the lagoon, in which stands *Lawlin Island*, the channel keeps on the West side, but as soon as the lagoon is opened pass over to the eastern side, and steer so as to pass close to and between two small grassy islets; thence make for a bluff point of trees, which stands just to the North of the northernmost factory, that of Mr. Walker, after passing which the New York Factory, the barracoon of Mr. Lawlin will be seen. The banks are here very steep-to.

The river here expands into a large lake, and above this again contracts, and is limited by wooded hills, and changes its name to *Rembo*, meaning *the river*.

From its flowing through the country of the *Camma*, or, as M. du Chaillu terms them, the *Commi* tribes, this southern portion of the stream has been called in the charts the Camma River, but it is the same as the Fernand Vaz.

The bar is infested with sharks, and generally has a heavy surf on it. Vessels should anchor abreast of the factories southward of the river, in not less than 7 fathoms. The trade here consists in ivory, ebony, gum-mastic, and india-rubber, there being five French factories on the river.

Sailing southward from the mouth of the Fernand Vaz, the "islands" of trees on the sandy shore become larger, and unite to form a considerable forest towards Santa Catherina, where, between the river and the sea, is the inhospitable jungle which forms the principal home of the gorilla hunted by Du Chaillu. At 10 miles to the southward of the Fernand Vaz, is *Duke Town*, consisting of a few large huts on the shores of a bay.

Camma Bay.—At the distance of about 25 miles S. by E. ½ E. from the River Fernand Vaz is *Point Metoutou*, the North point of a slight indentation or bay, called Camma Bay. It is 11 miles northward of Point Santa Catharina, the South point of the same bay. Point Metoutou is wooded, and projects very slightly beyond the coast line. At 2 miles North of it is seen the little *River Paradia;* and between this river and the point, but situated rather inland, is a clump of trees higher than those surrounding them. In Camma Bay the trees grow to the water's edge. There are several villages to be seen; and about 2 miles North of Camma River is the village of Kinimina, with an English factory; but the trade, consisting of ebony, ivory, and bees-wax, is very limited. The anchorage off the River Camma is nearly 3 miles off, in 6½ fathoms, but it is better to keep outside the depth of 7 fathoms. The natives call all the rivers, between Fernand Vaz and Setté, Camma.

Point Santa Catharina, when approached from the North, appears as a clump of lofty trees, which look as if they were separated from the mainland, and give the appearance of an island; in coming towards it from the South, the shore looks craggy. Around the point there is a reef of rocks and sand, extending 3 miles towards the North, where there is 6 fathoms water.

Some hills of slight elevation, to the South of the point, give the coast a bold appearance. Above the beach the land rises gently, the belt of trees and the drowned land disappear, and here and there are seen open spaces, which show some vegetation, and give the country, at a distance, a cultivated aspect. This is frequently the case on this coast as far as Kabenda.

From Point Santa Catharina to Point Pedras the coast runs S. by E. ¾ E., for a distance of 71 miles, with several slight indentations, in one of which, towards the West, is the mouth of the River Setté. It is low between these two points, with sometimes a narrow, sandy beach, and sometimes covered with trees down to the water's edge. About midway between Point Santa Catharina and the River Setté are some conspicuous factories known as *Engoi*. Between Point Santa Catharina and the River Setté there are several water-courses, indicated by narrow cuttings in the belt of trees on the shore, principally to the North of the River Setté, near to which the sandy beach reappears. Some higher hills also begin to be seen inland, forming a chain parallel with the beach. And here, in clear weather, the land may be seen from the mast-head, when in 35 fathoms, or from about 18 or 20 miles off shore.

The RIVER SETTE, the northern boundary of the kingdom of Loango, is a fine stream, with a depth of 3 fathoms at its entrance. The points at the mouth of it are about 1½ mile apart, and are low and covered with tall trees, as well as its banks, which renders it very difficult to distinguish the river. The town of *Setté* is built 50 miles inland, on the right bank of the river; it is the capital of the territory of the same name, the inhabitants of which formerly carried on a considerable trade with the Portuguese in red wood and ivory.

The entrance channel of the Setté is only two-thirds of a mile in width. It is formed by a wooded bank on the North, and on the South by a sand-bank, which, after stretching westward for about a mile along the South side of the river, continues round the southern point at a short distance, and extends itself up the river. The course of the channel is very nearly N.E.; near its mouth the river separates into two streams, the one running to the North, the other, which is the principal one, towards the East; it is on the latter that the town of Setté is situated. It is said that this river deepens after passing the bar, which is sometimes practicable for boats. There is a small conical wooded hill at the point where the river divides, which may also serve to distinguish it. The River Setté rises in the mountains of *Camplida*, and it is said to be 260 miles long.

From the River Setté the coast is low and woody for 15 miles; and then begins the chain of Santo Espirito Hills, which are the best marks for recognizing the River Setté and Point Pedras, which latter is 9 miles southward of these hills.

The *Santo Espirito Hills* stand back some miles in the interior, and form two remarkable patches of table land, covered with trees, flat at the top, and separated by a valley, at the bottom of which there appears to be a river running. They are beautifully ornamented with trees, and a vista in the middle. Pimentel describes them as two high mountains, flat at the top, which, lowering regularly on each side, unite equally with the ground. On the South side of these hills, some spots, apparently grassy, are seen, which, when you come near the coast, in 11 or 10 fathoms, appear quite barren. You ought not to come to an anchor, nor go nearer the shore than 9 or 8 fathoms, the bottom being full of sharp stones. So long as you find good ground, you may approach the land; but so soon as it becomes rocky, stand to seaward. There is great fishing on all this coast, chiefly for pargos or rocket fish.

To the southward of the Santo Espirito Hills there may be seen, when near the shore, in soundings of 10 or 11 fathoms, some of those spacious clearances, of which we have already spoken, and which give to the country the appearance of being cultivated.

Upon this coast, in general, the winds, during the fine weather, are from the S.W. These set in after noon, with land breezes from the N.E. early in the morning; but during the rains and winter months the winds are from the southward, with little or no land breeze. In the vicinity of the land the current runs with rapidity, and the coast therefore should be approached with due caution.

The shore is indented in many places between the Setté and Point Pedras by several streams.

Point Pedras is low, woody, and very difficult to make out, when seen from the West. It is more distinct from the South side, and projects about a mile beyond the line of coast. It forms the right bank of a river, the estuary of which, 7 miles northward of the point, runs from S.W. to N.E., and soon after turns sharply round to the S.E., rounding the Santo Espirito Hills on the South. Point Pedras is prolonged to the S.W. by a bank of rocks and sand, about 2 miles in extent, to which it probably owes its name. The Portuguese call it Cabo Primeiro. There is anchorage off an English factory about a mile northward of the point.

From Point Pedras to Cape Yumba, or Mayumba, the coast runs to the S.E. ¾ S. for 45 miles. Its appearance on leaving Point Pedras is very varied, showing at its foot a narrow sandy beach, covered at its top with thick mangroves. This sandy beach is not visible 6 miles off. A lofty range of hills, with rounded summits, is seen some distance in the interior. In many places the coast appears in three ranges or levels. In the parts South of Point Pedras, the first level is formed of mangroves rising from the water's edge; the second of tall trees, rather more inland; above which, the third, rise the heights before spoken of. Here and there some bare spaces, covered only with dry grass, make whitish spots amongst the verdure of the second range. But on nearing Cape Yumba, the aspect of the coast is different; here a white sandy beach forms the shore. From Point Pedras the coast rises gradually towards Cape Yumba, and the hills are close to the shore. The bank of soundings also increase in width. At 7 or 8 miles off there is 22 fathoms of water, with a bottom of muddy sand. In 36 fathoms the land is not visible, and the colour of the water indicates the bank of soundings. The coast is clean and steep-to, and may be approached within 2 miles without danger, in 7, 9, and 10 fathoms.

A little to the South of Point Pedras, among the trees which cover the shore, some houses or barracoons were seen, with various flags hoisted. A little farther there are some more houses, with red and white striped flags, which are also places for trade.

At 15 miles from Point Pedras there are two white spots on the inner range with those before mentioned. At 34 miles from Point Pedras the country inland appears hilly, and increasing in height as you proceed southward. These hills may be seen 25 or 30 miles out at sea. The hills on the shore are a range which is formed from old sand dunes, the surface of which has become hardened by the alternate effects of heat and rain. Between these parallel ranges there are lakes and marshes, as also between the first range of hills and the shore in many places. At about 20 miles North of Cape Mayumba is a very remarkable isolated conical mountain.

Cape Yumba, or Mayumba.—In coming from the North, Cape Mayumba, or Yumba, may be recognised by three or four undulating or saddle-shaped hills, skirting the shore, and falling abruptly to the sea, to the very point of the cape, on which are some clusters of trees. They are called the *High Land of Yumba*. At 5 miles off the cape there is 13 fathoms, bottom of sand and gravel.

At the foot of the high ground, which forms the cape, there is a rock or small islet joined to the land, to the southward of which is a creek, in which you may land. To the southward of Cape Yumba there is a river, which divides a short distance from its mouth, called the *Yumba River*, watering the Yumba province of the kingdom of Loango. It is said to be 100 miles long.

Cape Yumba is the North point of Yumba Bay, the South point of which is called Point Matooti. Its foot is surrounded by a rocky bank, extending to the S.W. for about a mile.

Point Matooti, which the Portuguese call *Cabo Segundo*, lies 10½ miles S. by E. ½ E. of Cape Yumba. To the East of this point, which is low at its extremity, there is a hill covered with trees, at the foot of which the *River Matambi*, runs parallel with the shore for several miles towards the South. Point Matooti is skirted on the N.W. by a ledge of rocks, above and under water, for about 2 cables, and at 6 cables N. by W. ¾ W. from the point is the outermost of two small black rocks, surrounded by a reef 3 cables in extent. The passage between is deep, but should not be used.

YUMBA BAY.*—Between the points, 10½ miles apart, Yumba Bay describes a tolerably regular curve, with a fine sandy beach. Some hills line its inner part, rising from the inner shore. They are lofty, especially in the South, and well wooded.

The South side of the bay is formed by a tongue of low land, which begins from Point Matooti, and runs in a northerly direction for about 2 miles, then to the N.W. for a similar distance. The North shore of the bay runs about W.N.W. to Cape Yumba.

The extremity of this tongue of land, or peninsula, forms the point of the left bank of the mouth of a tolerably large river, named *Louziby*, which empties itself at the bottom of the Bay of Yumba, through a very narrow passage, barred by reefs, on which at low water there is not more than 8¾ ft. water. This river, which is very shallow, and has only 12 ft. of water in the large basin within its mouth, is said to have a course of 60 miles.

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* *Yumba* is the name of that part of the kingdom of Loango in which the bay is situated. *Ma-Yumba* signifies King of Yumba. Yumba Bay is called by the Portuguese *Alvaro-Martinho*.

Into this basin, obstructed by banks and islands, the most remarkable of which are those of *Mavalaba* to the North, and of *Great* and *Little Yatumba* to the South, there runs in its North part the *River Comby*, on the right bank of which is a village of the same name; and in its South part the *River Matambi*, which runs parallel with the shore to the South. The best water is obtainable in the River Louziby. There are several villages on the coast, on the Yatumba Islands, and on the peninsula which encloses it on the West side. On this peninsula are seen some Portuguese and Brasilian factories, and a large village near to Point Matooti.

The Bay of Yumba is safe, except at those points we have marked. In coming from the North it will be necessary to keep at least 2 miles to the S.W. of Cape Yumba; and in coming from the South, keep 3 miles to the North of Point Matooti; but when once round the points, there is good anchorage all over the bay. The bottom is even, and shoals gently from the line of the two points.

At about 6 cables N. by W. ½ W. from Point Matooti there is a small island, called *George Islet*, about three-quarters of a mile from the bottom of the bay, and from which a reef of rocks extends 2½ cables N.E. by E. To the West and North of the bank, and close to it, there is 6 or 7 fathoms; to the East, 5 fathoms; and the depth gradually decreases to the beach, near to which there is 3 fathoms.

The best anchorage, because the quietest, is to the eastward of George Island Reef, in 6 fathoms, hard mud, with the islets in line S.W. by W.; or else anchor off the North end of the islets in 8 fathoms, one-third of a mile distant. Ships can also anchor on the line between Cape Yumba and Point Matooti, in soundings varying from 8 to 10 fathoms, brown sand. It is high water, on full and change, at $4^h\ 35^m$; springs rise 6 ft. 10 in.

There is good shelter in the Bay of Yumba from S.S.E. and South winds, but not so good from the S.W., except at the anchorage to the East of the reef and islets of St. George, which break the sea, and render the swell which generally prevails in the bay less troublesome.

Trade is carried on in the bay in ivory, wax, gum, dye-woods, and formerly in slaves. Abundance of fish is found in the bay, especially shell-fish; these, with yams, forming the chief food of the inhabitants, who are very wretched. Stock is to be obtained, but only in small quantities, unless two or three days time can be given to procure it from the interior. The chief town is on the peninsula, and may contain 1,000 people. All the country around is thickly wooded and low, and the inhabitants very poor.

An officer of the *Barracouta*, before quoted, observes that Yumba is now in a wretched state of poverty and dilapidation. He says that the anchorage is *not* good, as a heavy swell sets in when the wind blows on shore, and there is then no shelter unless by lying close in upon the southern side of the bay, which, from many reasons, is not advisable.

The Bay of Yumba may be regarded as being on the limits of the great rains. To the South of it the vegetation is not so vigorous; parched lands begin to appear, and naked hills, with their summits scorched by the heat of the sun, are seen. The coast indeed presents evident marks of drought, more or less intense; and these signs become more and more distinct on advancing southward.

From Point Matooti to Point Banda, the first projecting land to be met with, the sandy nature of the coast increases gradually, and at the foot of it is covered with trees. The first line of hills rises a short distance inland, and after that two other ranges within, rise one above the other.

A bank here skirts the sandy beach, extending half a mile off; at 9 miles southward of Point Matooti, a small island or large black rock shows itself on the bank, about 2 miles from the shore, which in this place is very remarkable. The heights, which come down to the shore here, are rugged, with broken peaks, and of a whitish hue. The trees which cover them are of a round form. Some rocks appear at the base of the hills, on the tops of which are single trees with tall stems, and some shady palm trees crown the lower parts. Farther on are some high peaks, a good way inland; more to the South the land reappears in three undulating ranges.

From Matooti Point to Banda Point the distance is 30 miles, S. by E. ½ E. The bottom near the latter is thickly studded with rocks and coral reefs, which extend 4½ miles N.W. in 20 fathoms. There is plenty of fish here, but the anchorage is very bad, and the coast should not be approached, even by the lead, on account of the irregular rocks. *Antelope Shoal*, of 3½ fathoms, lies 1 mile S.W. of the point.

Banda Point, which is low, may be recognised by two lofty hills, back in the third range, the summits of which are called *Paps of Banda*, from their form. A large village stands on the point.

From Point Banda to Point Kilongo the bearing and distance are S.S.E. 30 miles; the shore between has all along its foot a thick belt of trees, and one or two ranges of hills some distance inland, but not so lofty as those before mentioned. *Four rivers* enter between these points; the most northerly of which appears to be the mouth of the *River Matundi*, which opens to the sea. We have already said that this river, emptying itself in the North into the basin of the River Loumby, situated at the bottom of Yumba Bay, runs parallel with the shore towards the South. The second river, the mouth of which is 14 miles from Banda, is called the *Makanda*. This river, with a village of the same name on its left bank, about 3 miles up, is the southern boundary of the Yumba territory. Another small stream runs between the hills into the sea; and the fourth river is the *Kilongo*, 3 miles northward of Point Kilongo. It is said to be 30 miles long.

Point Kilongo is the South point of the small bay or creek in which the River Kilongo empties itself. This point is marked by a single hill with a flat top, situated on the left bank of the river's mouth, and by a reef, with 1 to 2 fathoms water, which extends half a mile, some say 2 or 4 miles, N.W. by N., which is the *Baxo do Indio* of Pimentel. There is tolerable anchorage in 4½ fathoms, reddish sand mixed with shells, to the North of the reef, in the cove which lies opposite to the entrance of the river. The land adjacent is moderately high, with several whitish patches. North of Kilongo Creek there is a large lake and a lofty mountain, with a peak or nib on its summit. The village of Kilongo is 3 miles inland, on the left bank of the river.

From off the River Kilongo the depth appears to increase gradually from 7 fathoms at 3 miles, to 60 fathoms 40 miles out. The shore between Point Banda and Point Kilongo is clean, and may be passed at a distance of 3 miles, in 6 or 7 fathoms. The bottom in the offing is for the most part muddy. Care, however, must be taken to avoid *Prometheus Shoal*, the northern part of which is about 6 miles N.W. by N. of Kilongo Point, and 3 or 4 miles off shore. It has not been examined, but is said to be extensive, with only 6 ft. water on it in some places, and steep-to. In this locality it is not advisable to approach the shore in less than 9 fathoms.

"Coming from the southward, pass the mouth of the Chillongo River (which is not in the bottom of the bay, but 5 miles farther in a N.N.E. direction), and the light-coloured hummock at the back; then steer for a dark bluff at the water's edge until Chillongo Point is in one with an easily-distinguished point 4 miles to the southward of it; being now well inside the reef, haul to the southward, and go as far into the bottom of the bay as desirable, 4 fathoms being a good anchoring ground a long way in. It does not break inside the bay during heavy calemmas even, as the reef forms a natural breakwater."—*C. Alexanderson, Esq., F.R.G.S.*, 1880.

From the Cove of Kilongo to the River Quiloo, or Killoo, the course is S.E. ½ S. 23 miles. "The land to the southward of the cove," says Pimentel, "is tolerably even, with some hillocks and lofty trees farther in, which terminate at a pretty high mountain, called by the negroes Salomba. The coast, for the space of 12 miles, appears white at a distance, with sandy downs, and has some palm trees. The bottom, along shore, is sand and stone, so that you ought not to approach the land nearer than 9 fathoms; this foul ground continues as far as the River Quiloo. On the North side of the entrance of the river are two small wooded eminences, called, by some navigators, the *Paps*. You can land here in boats only, as a bank of stones and sand exists, on which there is only 2 fathoms of water."

Mullet Bank is a narrow ridge of hard sand and rock, about 7 miles in length, and 4 miles off shore, midway between Kilongo Point and Killoo River. There are depths of 9 and 10 fathoms around it. The shoalest water found, 4½ fathoms, is on its southern end.

The River Killoo appears rather a large stream. It runs across a very flat country, towards the E. by N., for 27 miles from its mouth. At this point it divides into two branches, the one running to the N.E., the other S.E. On the latter are the villages of *Kibota* on its right bank, and of *Bando* on the left. The entrance to the river appears to be barred by a reef of sand and rocks, on which there is only about 12 ft. of water. It is not, therefore, practicable except for boats. It is probably the same river as the *Yumbo River*, said to lie 5 miles to the N.N.W.

The South point of the mouth of the River Killoo is called Kisanga. It is wooded and rather elevated, as well as the North point, and may be considered as the North point of the Bay of Loango.

LOANGO BAY.—From Point Kisanga the coast, with a sandy beach, runs southward, curving in and out, for about 4 miles; then to the S.W., and forms the S.W. point of Loango Bay, called *Indian Point*. From Point Kisanga the coast rises again, and shows a range of hills above a sandy beach covered with a bank of thick trees.

A little to the North of Loango Bay, two distinct ranges of hills, with bare summits, exhibiting only a few lines of verdure, separated by a short interval from each other, runs towards the bay. They are very steep on the shore side, and are of a bright red colour; the green lines separating the naked

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

LOANGO. [illegible] the kingdom of Loango [illegible] miles [illegible] of Indian Point. [illegible] more South [illegible] from the [illegible] of the bay [illegible] place called [illegible] This spot may be known [illegible] the top of the heights, called the *Wood of Lo*[illegible] It is said that [illegible] A little more South still, and 3 miles [illegible] ground of the kings of Loango, called [illegible], situated on the right bank of the stream, which runs into the bay in the South.

This bay was formerly an active mart for the slave trade. The two marks for [illegible] the Bay of Loango are, when coming from the North, the [illegible] we have mentioned, and from the South the Wood of Lochou, which is, however, not so easily distinguishable from other clumps of trees as it formerly was. When coming from the North to the anchorage, keep the [illegible] on the shore S.E. ½ S., and keep on with this bearing. By this means you avoid the Indian Bar. The bottom shallows gradually towards the shore of the bay, so you may cast anchor in any depth you like. In the bay the depth varies from 5 fathoms on the line between the two points, to 2 fathoms near the beach. The West side of Indian Bar is very steep, and the depth varies from 4 to 5 fathoms near its N.E. end. When entering the bay from seaward, keep the Wood of Looboo bearing S. 82° E., and steer right for it with this bearing.

The bank of soundings appears to extend for a long distance off on the parallel of Loango Bay. Thus, 5 miles West of the line joining the two points there is 12 fathoms, mud; at 14 miles, 18 fathoms; at 22 miles, 32 fathoms; and increasing to 60 fathoms at 50 miles out.

The anchorage most convenient for entering is to bring Indian Point to bear S.W. by S. ½ S., and the factory on the shore S.E. by S.; you will then be in 4½ or 5 fathoms, reddish brown mud; the usual bottom of the bay being mud, with sand and shells, or sand and coral. It is excellent holding ground.

It is prudent, in the stormy season, which begins in October, to anchor at the place indicated; for the squalls, which are sometimes very violent, generally come from the East, and you should not come too near the Indian Bar, on which the vessel would be driven, if she should drag the anchors. There is otherwise no chance of this if the anchors are good, since the holding is excellent, and there is never any swell. It is best in this anchorage to moor North and South; though convenient for watering, it becomes dangerous with rollers; so that on the first appearance of them the ship must be got under way, or be towed out to sea.

We have said that good water may be got from the brook on the beach. But if you remain 24 hours in the bay, you will be able to get from the inhabitants fowls, pigs, goats, vegetables, bananas, and gourds, in exchange for merchandise or dollars, the coin best known by the natives, who are great thieves, but otherwise inoffensive. The regular trade is chiefly in ivory, which is very abundant. Fish is plentiful.

The town is large, with broad regular streets. which are kept clean and in good order, and planted at each side with trees. There are great numbers of huts built so as to forms squares; some of the barracoons, or buildings, are large, as if designed for factories, or peradventure to afford accommodation to slave dealers. The palace of the sovereign is not one of any great importance, although he possesses some furniture and even plate.*

Captain Owen says, that Loango Bay affords excellent shelter to small vessels; and even for large ones it is preferable to Kabenda, which is 60 miles more to the southward. The scenery is likewise more varied and interesting although the dwellings of the inhabitants are, according to the custom of the country, not visible from the sea, being hidden in luxuriant low lands; a custom which doubtless has had its origin from the system of kidnapping so much practised by the Portuguese.

The natives were very friendly. Numerous lagoons exist at about 200 ft. from the sea, extending parallel with the shore, and communicating with the beach in various places by drains and small creeks.

It is high water, on full and change, in the bay, at 4^h 30^m; the tide rises 6½ ft. The ebb tide runs out of the bay very fast, especially at springs.

Black Point Bay.—Indian Point is the North point of another bay, still safer and better sheltered than that of Loango; it is called Black Point Bay, from the name of its South point. South of Indian Point the sandy beach reappears; and between the hills and the sea is a beautiful plain covered with tall trees of dark foliage.

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* "Six Years of a Traveller's Life in Western Africa," by Fr. Travassos Valdes, London, 1861, Vol. ii., p. 69.

The land is moderately high, fertile in appearance, and well cultivated, with hills and valleys, then a line of downs, on which are here and there some very picturesque woods. South of the bay these trees come down to the beach, and form a low, dark headland, thence called Black Point, the South extremity of Black Point Bay. At the bottom of the bay the plain is 3 miles wide, and looks very pleasant.

Black Point, in lat. 4° 49′ S., long. 11° 45′ 22″ E., lies 9 miles S. ¼ E. from Indian Point. A bank, which does not always break, but generally shows, runs to the N.W. of Black Point for about a mile, and for two-thirds of a mile to the West. Therefore, when coming in to anchor, a wide berth of 2 miles must be given to this point. This bank is very steep-to; off the North part of it there is from 8 to 10 fathoms.

The soundings in the bay are very regular, and diminish gradually, from 10 fathoms on the line between Indian and Black Points, to the shore.

From Black Point the coast within the bay trends round to the eastward for about a mile, forming a low, sandy, narrow peninsula. This peninsula, running parallel with the shore, at the botton of the bay, forms, also, a sort of inner bay, with a narrow entrance, between the East coast of the bay and the prominent extremity of the peninsula. This second bay is open only to the N.E., and had a depth of 12 or 13 ft. in 1845; in 1863 it was nearly filled up. The extremity of the peninsula is called *Sandy Point*. A lagoon and a village are situated at the bottom of this second bay.

In standing into Black Point Bay from seaward there will be seen, among the other trees which crown the hills, the clump of bushes, Looboo Wood, of which we have spoken before. When it bears N.E. by E., then make directly for it, and so avoid the bank off Black Point. The depth, on this track, decreases gradually from 18 to 4 or 5 fathoms, where the anchor may be dropped, if thought convenient. Or, as the depth decreases gradually, you can anchor anywhere in the bay, according to the vessel's draught of water. One of the best anchorages is on the line of Sandy Point, near the village, keeping it South, and Black Point W.S.W.; where there is 5 fathoms something less than a mile from the East shore of the bay.

But being so near the shore, in case of rollers setting in, we must repeat the remark we made in the case of the anchorage at Loango. Large ships also had better anchor with Black Point bearing S.W. ½ S., and Indian Point N. ½ W., 1 mile from the shore. There is a troublesome ground swell, but the holding is good.

When making for the bay from the South, care must be taken not to confound Black Point with another point about 6 miles to the southward, which very much resembles it. It is very necessary, therefore, to look out for the Looboo Wood, to determine exactly where the ship's place is. The second headland is called *False Black Point*. Looboo Wood, always difficult to recognise, cannot be seen till to the North of False Black Point, and hence the necessity for taking it as the mark. After running to the N.E. as far as where False Black Point can be clearly distinguished, the ship's head can be turned to the S.S.E. to get to the anchorage, going by the lead.

The landing is good in the creek in the North of the bay, and fresh water can be easily got there at a spring; sometimes, however, it is not plentiful. And besides, the getting the water on board is a labourious work, because you cannot get near the watering-place on account of the shallowness of the water in the creek, and so the water has to be carried in small casks. About a tun an hour can be got in this way.

The best and most abundant watering-place is 2 miles South of this creek. It is a small lagoon fed by a spring about 45 yards from the beach, very near to which you can moor with a grapnel, if the swell be not too strong. There is a pathway to it, which, however, will have to be cleared of grass and brushwood to make it passable.

The position of the lagoon is 1½ mile S. 60° E. of the anchorage ground indicated for large ships. Captain Mundy, of H.M. frigate *Iris*, put up a beacon to mark the spot.

Poultry can be obtained in this bay, and pigs, goats, vegetables, and some kinds of fruit in exchange for goods or dollars. Fish is plentiful. The bay was an active mart for the slave trade.

LOUISA-LOANGO RIVER.—From Black Point the coast runs S. by E. ½ E. for 18 miles, as far as the River Louisa-Loango, the northern boundary of the kingdom of Kacongo. It is moderately high, wooded, with a white sandy beach, and some prominent undulations. It is safe, and very steep-to. Three miles out there is 7 and 9 fathoms, soft muddy bottom. The low woody country terminates at the Louisa-Loango River. Some breakers indicate the North point of the mouth of this river which is of considerable length, and is said to lead first to the East, and then to the S.E. On the left bank, 40 miles up, is the town of *N'Singa;* and 58 miles up on the right bank is the town of *Kinghelé*. We have no information of interest about this river.

Kacongo Bay.—At 9 miles S. by E. is the River Kacongo. M. Kerhallet says:—"The two rivers, Louisa-Loango and Kacongo, both run into one bay, which is called, we know not why, the Bay of Kacongo, and which we will call by this name to avoid confounding it with the bay South of Point Banda and North of Loango Bay."

From the left bank of the River Louisa-Loango the land rises rapidly towards Kacongo Bay. The heights come right to the water's edge in the North and near to the Kacongo River.

The swelling hills are covered in places with dark-coloured trees, which stand out very distinctly from the greenish grey herbage which grows where there are no trees. This first range of moderately high hills terminates at the right bank of Kacongo River. There the country is low for the space of 2 or 3 miles; and then, on the left bank of the river, the coast rises again, attains nearly the same elevation as before, and as far as Malemba the hills are of the same appearance as those on the North of the right bank; only they are more abrupt on the South side towards the sea, which reaches to their foot, and are furrowed here and there by ravines down to the shore; they also show reddish patches in several places.

Kacongo Bay, which ought not to be so called, is a mere indentation of the coast, formed chiefly by the entrance to the Kacongo River, which appears to be a large stream. The sea is very much discoloured for a considerable distance, as far as where there is 17 or 19 fathoms, muddy bottom, 7 miles out. The trading station of *Chinshonxo* stands on the North point of the river. On the right bank of the Kacongo, which appears to lead E.S.E. and S.E., stands the town of *Kaya*, 30 miles from its mouth, and 8 miles farther the town of *Boonia*. Very little is known about the entrance or the navigation of this fine stream.

From the South point of the mouth of the Kacongo River, the coast takes a S. ½ W. direction for 10 miles to Point Malemba, the S.W. point of the Bay of Malemba. In this distance two watercourses intersect the shore; the first, 3 miles southward of Kacongo River; the second at 6 miles.

Landano.—The stream and village of Landano lie 3 miles to the southward of Kacongo River, and is one of the largest factory stations on this part of the coast. It is a great entrepôt for the produce of the interior, and is the market where all direct trade with the natives is transacted by the Portuguese, who have factories extending a long distance up the small river. In December, 1867, there were no fewer than seven merchant vessels at anchor off the place. The bottom within 2 miles of Landano is rocky, and therefore dangerous, but at 3 miles off shore H.M.S. *Vestal* anchored in 5 fathoms, mud.

Stock and vegetables may be obtained at Landano by giving twenty-four hours' notice, but not in abundance, and the landing is generally very bad. The safest plan is to keep outside the surf and await the arrival of a large canoe, which the people on shore generally send off. These remarks also apply to Chinshonxo. The best plan is either to proceed to Kabenda, or anchor anywhere between Landano and Kabenda, when the native canoes will come off with pigs, goats, eggs, yams, plantains, and enable the crew to obtain a fresh mess.

Malemba, or Molembo.*—The country around Malemba is elevated like that we have just described, only the projections are more prominent, the ravines more declivitous; the sides towards the sea, which washes their foot, are so abrupt as to form rugged precipitous red cliffs, covered with vegetation. The Bay of Malemba terminates in the S.W. by a point of the same name, which is a headland projecting from this rugged tract. The effects of light and shade in these parts are very singular.

Point Malemba is formed by a tongue of land, of an even surface, covered with grass. It runs from the foot of the high cliffs, in a N. by W. ½ W. direction, into the sea. Viewed from its extremity, which shows at its base a reddish, ferruginous appearance, it descends in a long slope to the sea, and seems detached by its dark shade, from the less tinted land at the bottom of the bay.

The small but excellent Bay of Malemba is one of those indentations in the coast, of the form which is in some sort common to all the bays on the African coast, South of the Equator. They almost all penetrate in a S.E. direction, are open to the S.W., and sheltered on the West side by a bank or tongue of land, often level with the sea, stretching from the S.W. part of the bay some miles towards the N.W., and so protecting the anchorage ground from the swell of the sea and the prevailing winds. This almost universal form of the bays on the West Coast of Africa, South of Equator, is owing most probably to the action of the swell from the South and S.W., combined with the prevalent current, which runs up the coast from South to North, and turns to the N.N.W. and N.W. This peculiar character of the bays often renders them very difficult of recognition when coming from the West, because then the banks which skirt the points from the S.W. not being distinctly visible out at sea, or being confounded with the land at the inner part of the bays, are thought to be merely indentations in the shore, offering no shelter. This is the case in the appearance of the bay we are now describing.

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* Valdez states that this territory, and that as far South as Angola, was ceded to the Portuguese Crown by the King of Malemba, on December 30th, 1854. But it is usually considered that the Portuguese territory of Angola is limited by the Rio Loze, in about lat. 7° 45′ S.—(See *Valdez*, vol. ii., pp. 70—72.)

Its S.W. point, Point Malemba, is prolonged seaward in a N. by W. ½ W. direction by a bank, on which the general depth is 3 fathoms of water. This narrow bank, being less than a quarter of a mile wide, is 1¼ mile long from the point. It is formed of rocks, and on the top of one of them, four-fifths of a mile out from the point, there is only 12 ft. of water. The sea breaks on the very foot of Point Malemba; and to the West of the point the bank extends three-quarters of a mile. This bank, which forms the West side of Malemba Bay, is not always visible. From Point Malemba, eastward, the coast runs in, and forms, as in Black Point Bay, a prominent low and sandy peninsula, parallel with the shore, from which it is distant about 170 yards. Its extent from Point Malemba is about half a mile.

The breadth of the Bay of Malemba, between the end of the bank and the shore, is nearly a mile, and diminishes gradually inwards.

Around the bank off Malemba Point, in its steepest part, there is 4, 4½, and 5 fathoms, with a bottom of sticky mud, like clay. In the bay the bottom is of the same character, and its usual depth varies from 4½ to 4 fathoms. At its entrance there is 5 and 6 fathoms water. It is here you must anchor, about 3 miles from the bottom of the bay, and 3 miles from Point Malemba, with the point bearing S. by E. The red colour of the hills to the North of Malemba Bay, with the Point of Malemba itself, is a good mark to recognize it by.

Opposite the bay, 3 miles inland, is the village of *Mayooba;* then farther South, on the parallel of Point Malemba, 7 miles up the country, is the village of Kilongo. It is this latter, no doubt, which has induced some navigators to give the name of Kilongo to the bay more to the North, which we have called Kacongo.

Malemba Bay, excellent for small vessels, is not fit for those of greater draught; for these, being obliged to anchor a long distance out, are generally troubled with the heavy rolling sea. Rollers are frequent and very strong, particularly at the time of full moon. They occur most frequently during calms. Thus, frequently even small vessels dare not anchor in the bay to the East of the bank on Point Malemba, for they find themselves, in storms, or during these tide races, in circumstances very similar to what we described in reference to the Bay of Loango, at the inner anchorage. On this account, therefore, ships which come to water prefer anchoring to the S.W. of Malemba

Point, in 6 or 7 fathoms, mud, or in 7½ fathoms, sand and gravel, at 2 miles from the shore, which is abrupt, and the beach very narrow. There is a fall of excellent water there.

You can land in small boats at the foot of Malemba Point, on the East side, when you want to go to the factories in the bay, which are built on the top of the shore, and are approachable by direct pathways. A small rivulet runs at the bottom of the bay, of excellent water, which may be got without difficulty, and you can land on the beach, there being no tide races there.

Malemba may justly (says Capt. Adams) be considered as the Montpelier of Western Africa.

The trading town of Malemba is under the command of a *Cheenoo*, or *chief*, who resides at *Chingélé*, or *Kinghélé* (before mentioned), about 50 or 60 miles from the sea. It stands near the margin of a cliff that rises abruptly from the shore to an elevation of 100 ft., and is composed entirely of a dusky red argillaceous earth.

On gaining the summit of this cliff, an extensive and beautiful plain presents itself as far as the sight can reach, to the East and South. To the North the country is broken by the windings of the Kacongo River, the margins of which are finely wooded. The plain is covered with a luxuriant grass, and clumps of trees are scattered upon its surface, having the appearance of being planted by the hand of man, to afford him shelter from the sun and rain, and to adorn the landscape.

The climate of Malemba, in comparison with other parts of Africa, is very salubrious, owing to the dryness of the atmosphere and soil, and the absence of those dense forests so common in other districts; the Europeans trading here have, in consequence, almost uniformly enjoyed good health.

The natives are mild, tractable, inoffensive people, of small stature, and not at all warlike, but are said to be great thieves.

From the steep cliff which forms Point Malemba, the coast runs about S. by E.; and nearly 5 miles from the point there is Point Cascaes, low, and rather prominent, which defines the end of the cliff.

Point Cascaes.—The North point of the Bay of Kabenda is a seaward extension of a lofty hill of the same name. This mountain which is part of the general range, differs from it in respect of its having no bluff projections. When seen from the North or South, Point Cascaes is distinguished by a brighter colour from the land off which it projects.

South of this point the hills which line the coast disappear, and there is a low plain which extends southward as far as the mouth of the *River Belé*, about 5 miles from Point Cascaes, in the Bay of Kabenda. There is a great number of palm trees in this plain, which is very wide, and runs to the East to the foot of some hills, which are very declivitous and abrupt on their West side.

River Bele, about 6 miles N.E. from Kabenda Point, is a small watercourse, bounding the territory of Kacongo on the South, and on the North that of *N'gayo*, which extends as far as the right bank of the River Congo.

From the left bank of Belé River runs a bank of sand and rocks, called *Belé Bank*. The extremity of the bank has only 2¾ fathoms of water, but the sea does not break except with the ground swell or races. It extends in a westerly direction for more than 2 miles, as far as the line between Point

Malemba and the S.W. point of Kabenda Bay, called Point Palmas, or Kabenda Hook. To avoid it, from Point Cascaes you must keep 4 miles from the shore, or in soundings of not less than 8 fathoms, when you want to coast along to make Kabenda, or when you go out of the bay to the North.

From the anchorage at Malemba to the Bay of Kabenda the course is very nearly S. by W., and you must keep the lead going to be sure of the proper depth.

KABENDA, or Cabinda.—The Bay of Kabenda is one of the most remarkable points in this part of the coast, because its population is more industrious and civilized than the people elsewhere. There is a great similarity between this tribe and the Krumen, described on the Gold Coast. They row or paddle along, without intermission, under a vertical sun, singing their monotonous chants or songs. They are very tenacious of their honourable name as good and experienced seamen, and receive as the greatest insult any expression that seems to suggest a doubt as to their excellence in this respect. They are generally preferred by all as servants or hired people. Their pay is about 5*d.* per day.—*Capt. R. F. Burton.*

Kabenda Hook.—The S.W. point of Kabenda Bay is called Point Palmas or Kabenda Hook; it is in lat. 5° 33′ S., long. 12° 10′ E. It is a tract low at its extremity, and covered with bushes, which rise gradually and become of moderate height some distance from its extreme end. On the highest part are some bushes, and there are bare patches between the shore and the summit. Some huts are visible at the North of the point.

A bank runs along the West and S.W. sides of the point to the distance of three-fourths of a mile off, and joins the point at its northern end, off which, but close to, are some rocks; within them to the eastward is a convenient landing-place. Thence the coast curves inwards and forms a fine sandy beach, which rounds to the northward after 1¼ mile. The 3-fathoms line across the bottom of the bay extends 1¾ mile from the depth; but outside it is a detached rocky patch three-fourths of a mile in extent, on which rollers frequently break. On the centre of the patch there is 2¼ fathoms, and a little to the southward are some rocks awash at low water, which lie N.E. ¼ E., 1¼ mile from Kabenda Point.

The town of Porto Rico, or Kabenda, is very plainly seen from the North, and lies about half a mile from Point Palmas. The houses, with various flags upon them (including the English), are large and well built; the footpaths lead from the seaside to the top of the hill, where they stand. About 1¼ mile from these are seen some huts standing on the left bank of a small stream, which is the watering-place, and is called *Locola*, the water of which is not very good.

The land at the bottom of the bay is tolerably high, a red bank with low trees dotted over its cliffs, very pretty. Some of these cliffs are white, others red, like those seen in some parts of England. On these heights, and to the North of the watering-place, are several villages, called *Vanaté*. More to the North is a point called *Umbrella Point*, rounded and sloping gently to the sea. This point is on the left bank of a small river, called *Lolondo*. The land then, winding to the North, gradually becomes very low in the neighbourhood of the River Belé. On the hills at the bottom of the bay, a little to the South of the River Lolondo, there may be noted some tall trees, covering their summit.

Goats, pigs, and poultry are abundant, and to be obtained at a reasonable price; but sheep are scarce. Trade cloth and bottles are the principal articles of barter. The bay abounds with fish. The trade at Kabenda is in ivory, gum, wax, and honey; there is also a little orchilla and gum copal to be got. The country around is very fertile, producing various tropical fruits and vegetables.

When approaching Kabenda from the northward, a vessel should not haul in for the bay, until Porto Rico bears to the eastward of South; and when coming from the southward, not until Kabenda Point bears S.E. These two bearings will clear respectively, Belé Bank to the northward, and the shoals off Kabenda Point, and a vessel may safely approach Kabenda Point, and anchor where convenient.

A good line of direction on which to approach Kabenda is with a large conspicuous building on the summit of the hill, named *Franca's House*, on with a clump of palm trees just within Kabenda Point, S. by E. ½ E., until the scattered village of Vanaté bears S.E. ½ E., when steer for it, and anchor in about 4½ fathoms, with Kabenda Point S.W. by W. In connection with the anchorage in Kabenda Bay, there is much discrepancy respecting the best position; for, whilst some authorities recommend an inshore berth, others as strongly advise keeping well out. It is not, however, prudent to anchor in Kabenda Bay in less than 3½ fathoms, which depth extends over some distance, for there is always a swell in the bay, especially during the prevalence of the smokes.

But as the desired position must necessarily depend on circumstances, it would be as well to observe that, as the rollers frequently set in with great violence, it is unadvisable to take up an inshore berth, if intending to make only a temporary stay, and therefore the land to the southward about Red Point should be kept just open of Kabenda Point, and the large house on the top of the hill should be brought to bear S. by E.; in this position there will be about 5 fathoms water.

The depth of water in Kabenda Bay is reported to be less than that shown on the existing charts. Franca's House, one of the leading marks, is so surrounded by trees that it is difficult to distinguish.—*Lieut. Ogle*, H.M.S. *Dido*, 1880.

The following remarks are from Captain Owen:—

"From Kabenda to the Congo, a distance of 33 miles, the country is particularly fertile, and has a most luxuriant appearance, with apparently a large population, as numerous canoes may be seen fishing off the shore. The land is low near the shores, but sometimes terminating in a cliff; while, at a short distance inland, may occasionally be seen a high and sloping ridge of beautiful park land, the valleys presenting a most fertile prospect, abounding in groves of trees, among which the common palm was the most conspicuous.

"The numerous huts that skirt the bay in groups, and extend inland to the distant hills, can scarcely be considered as forming a town, but rather an assemblage of villages, each respectively governed by a *Mafuka*, but the whole under the superintendence of Prince Jack, next heir to the king, whose capital is *Goy* (*Angoij*), a large town about 6 miles from the sea, containing a great population. The whole coast presented the appearance of being densely inhabited.

"The scenery in Kabenda Bay is composed of lofty cliffs, verdant hills, and deep luxuriant vales. A great variety of trees, both in size and species, are dispersed in every direction, rendering the appearance of the country picturesque and pleasing. It is, however, impossible for a vessel touching for a few hours only to obtain provisions; for, as they are a minor branch of trade, when compared to that in slaves, ivory, or cam wood, none are engaged in it but those who have not the means to pursue any other. The residence of these people is in the country; and great delay takes place, even after they have received information of a vessel's arrival, before they come with their stock; and then the articles for exchange (for they will not take money) must be sent on shore, and the whole process of bargaining gone through.

"There are no bullocks here, but numerous herds of buffaloes range the forest in a wild state. These are hunted down and shot. Sheep are also scarce, but goats are plentiful, as well as ducks and fowls, but very dear.

"The natives are very desirous of procuring tobacco; but, as our crew were not overstocked, we did not barter much in that article.

"Parrots are very numerous here, enlivening the woods with the most shrill and discordant noises."

M. de Kerhallet says, "Kabenda is not a place for provisioning; but fowls, goats, and some kinds of fruit may be got, which may be advantageously exchanged for merchandise, or *fazenda*, a kind of coarse cloth. The bay, moreover, abounds with fish.

"The inhabitants of Kabenda are intelligent and industrious. They resemble, in some respects, the negroes of the Kru country, and willingly engage themselves to serve on board ship, during a stay upon the coast. They are also very useful in loading and unloading vessels."

From Point Palmas or *Kabenda* the coast runs S.W. ½ S. for 12 miles, as far as the projecting headland, called *Red Point*. The bank around Point Palmas, extending along it towards the West, continues to follow the coast, with a breadth of 1½ mile, as far as the point. On some parts of it there are generally breakers. The coast between these points is low, covered at its edge with trees and mangroves. It rises a little in the interior into hills of a reddish colour, which are abrupt on the side towards the sea. This first line of hills is overtopped by another farther back, a good way in the interior.

The hills in the first range, of a nearly uniform height, rise 3 miles South of Kabenda, and extend to the mouth of the River Congo. Their summit, slightly undulated, only shows some depressions, with angular edges. In some places there are seen palm trees, which look as if they were laid out in regular plantations; sometimes the trees on the shore are interrupted by forests of palm trees, presenting the same appearance.

These hills, of an argillaceous nature, burned by the sun and beaten by the rain, are very friable, and crumble easily. A great number of torrents descend from their tops, and cut deep gullies in them. Dried up in the fine season, they become vast torrents in the rainy season. South of Red Point, the coast shows more distinctly the two line of hills. At 5 miles South of Point Palmas,

III.—COAST OF CONGO.

n 1484 Diego Cam set out from the settlement of Elmina, to continue the vey of the West Coast of Africa. He crossed the Equator, and discovered River Congo, also called Couango, Zaire, or Zahir. He erected a marble umn on the South cape of the entrance to it, and thence the cape has taken name of Cape Padrao (C. Pillar), by corruption Padron. This discovery tained in those days considerable renown.

The kingdom of Congo extends to the South as far as the River Loze, or mbriz Bay, which is the northern boundary of the Portuguese possessions the West Coast of Africa, South of the Equator. The three western provinces of this kingdom, which are washed by the Atlantic, are called, the most ortherly, Sonhio; the middle one, Bamba; and that to the South, Mazula. hey are entirely independent.

The West Coast of Congo has an extent of 115 miles, from Cape Padrao to oint Loze. The province of Bamba is separated from that of Mazula by the River Onzo. On the left bank of this river, and near its entrance, stands the town of Mazula. The whole of this country is intersected by a great number of rivers, descending from the western side of chains of hills in the interior, to which the Portuguese have given the names of Do Sal, Do-Sal-Nitro, and Do-Cristal. The principal rivers of the coast we are now engaged upon are, as we proceed from North to South, the Rivers Ambriz, Couza, Rio Doce, or Loze, Onzo, and lastly the Dandé.

The trade with the Congo has very sensibly increased during the last few years, owing to the abolition of the slave trade, and consequent improved condition of the natives. The Portuguese have numerous factories at Puerto da Lenha and Embomma, 67 miles up the River Congo, and the agents of several English, Dutch, and other houses, have lately established themselves there. The natives speak both English and Portuguese. The river is navigable for sea-going ships for a distance of over 100 miles. Captain Bedingfield took H.M.S. *Pluto*, drawing 12 ft. water, to Embomma, in 1860, and since that time several of H.M. vessels have ascended to the same place. The palm oil of the Congo, which forms one of the chief exports, contains a large percentage of stearine, and is considered the best on the coast, commanding much higher prices than any other.

Several missions, aided by steam launches, are now engaged in forming stations on the upper part of this river, the most important of which is the Belgian one, under the direction of Mr. H. M. Stanley, the famous African explorer, who is engaged in making roads where the river is blocked by cataracts and falls, and thus joining the navigable parts together. The most easterly stations are on Stanley Pool, in about lat. 4° 10′ S., long. 17° E., 350 miles in a straight line from the coast, and 155 miles above Boma. The river, above Stanley Pool, is said to be navigable for 1,000 miles into the interior, and Mr. Stanley has named it the *Livingstone*, in memory of Dr. Livingstone, the great African missionary traveller. Stations will also be established on this part of the river, and in course of time, this will be one of the principal highways to the interior of tropical Africa. Mr. Stanley followed this river from the town of *Nyangwe*, in about lat. 4° 15′ S., long. 26° 15′ E., to the sea, and had many narrow escapes from the hostility of the natives, and the dangerous cataracts and rapids. In its higher part it is known as the Lualaba, and from its most distant source to the sea it is about 2,600 miles in length.

The natives of the Congo country are, as a rule, far inferior to those of the Bight of Benin, Lagos, or Accra. They are smaller and weaker, and show a lower order of intelligence. They used to fetch fewer dollars in the Cuban market, a conclusive proof—about 20 per cent. less than the slaves exported from the port of Whydah.*

This river is considered to be the fourth in magnitude of the African rivers, but beyond its lower course little or nothing is known. It was first approximately delineated by Captain Maxwell, in 1793, and was more completely surveyed by the unfortunate expedition of Captain Tuckey, R.N., in June, 1816. The lower part of the estuary was again surveyed by Captain Vidal, in December, 1825, and these form the basis of our present charts. But they are far from complete. We have no great hydrographical account, but some good information is given by the reports to Government of H. M. B. Consul, Captain R. F. Burton, so frequently quoted, who ascended the river in July, 1863. Our latest information of the upper course of the river is derived from the travels of Mr. H. M. Stanley, who descended this river from the remote interior on his journey across Africa from East to West. An interesting sketch map of the course of this river from Stanley Pool to the sea is given in the Proceedings of the Royal Geographical Society, January, 1881, p. 64, by the Rev. T. J. Comber, who is engaged in the Baptist Mission on the river.

" With respect to the names of this noble river, Diego Cam, the discoverer in 1485, called it *Congo*, from the country which it waters. Afterwards it was known as *Zairo*, which Father Merollo, 1688, derives from 'zeosco' (I don't know), the native reply to European inquisitiveness. D'Anville named it *Barbela*, a word unfamiliar to the people on its banks; Tuckey (1816) learned that it ought to be called *Moienzi Enzaddi*, the great river.

" As may be imagined, the various tribes living near the Congo have no one name for it. Even in Fiote, or the Congoese dialect (wonderfully resembling the Kisawahili of the Zanzibar coast), we find Mukango, or Lango, the water; Nkoko, the stream; Mwanza, the river; Mwanza N'nene, the great river; and Mwanza Nzadi (whence Moienzi Enzaddi), or the River Enzaddi. The latter being the only proper name, was corrupted into *Zaire*, and even

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* Capt. Burton's voluminous Report of the Trade and Mercantile Establishments in his Consulate of the Bight of Biafra, dated April 15th, 1864, is given in the Parliamentary Reports, 1865, vol. lvi., pp. 240—252. The condition of commerce, the chiefs and their government, and the articles of trade, are therein very fully treated on.

Capt. W. F. Ruxton gives some interesting information in his description of the expedition against the natives for their attack on the *Sweridge* schooner. See *Ocean Highways* for October, November, and December, 1872.

See also "Angola and the River Congo," by J. J. Monteiro, 2 vols., 1875; a work containing much valuable information relating to this district and its productions. "Two Trips to Gorilla Land and the Cataracts of the Congo," by Capt. R. F. Burton, 1876; and "Through the Dark Continent," by Henry M. Stanley, 2 vols., 1878. In the latter, an interesting account of his descent of the Livingstone River will be found, with Maps.

Zahir. The Portuguese, however, pronounce the word with a diæresis (*Zaïre*)."—*Capt. Burton.*

The Congo brings down an immense volume of water, which has hollowed for itself a narrow bed, of very variable depth. In many places no bottom was found with 200 fathoms of line, but of course the rapidity of the current would carry the line with it. At 40 miles from its mouth its waters are only partially mingled with those of the sea, and sometimes 9 miles out they are still quite fresh. From the great inclination of its bed, it shoots out to sea in one unbroken stream, and so forms no delta.

The main body of the stream of this mighty river is indicated by floating masses of bamboo, and debris of all kinds, which it carries far out to sea. The velocity of the current is said to range at from 4 to 8 miles an hour. It is high water, on full and change, at $4^h\ 30^m$ at the mouth of the Congo; springs rise 6 feet.

The stream of the River Congo is felt at a great distance out to sea, and ships which cross it, in going to the North or to the South, ought therefore, to guard against it. It is stated that 300 miles out the water is discoloured, and that the current of the river is perceptible at that distance, which is not impossible. Commander Richards saw floating grass islands, green and fresh, off Anno Bom Island. In May, 1867, H.M.S. *Oberon* experienced a set of no less than 220 miles, in a general N.W. (true) direction in four days, between the positions of lat. 0° 15′ S., long. 5° 45′ E., and lat. 4° 20′ S., long. 10° 34′ E.

The Congo is only 7½ miles wide between the West point of its entrance, called *Shark Point*, and the East point, called *Boolumbemba*. The former bears W. ½ N. from the latter. Between Shark Point and *French Point*, to N.N.E., it is 6 miles wide. It is 24 miles from Red Point, described before, to Shark Point, and 26 miles between Red Point and Cape Padrao, the S.W. point of the mouth of the river. Within these four points the mouth of the Congo is funnel-shaped, very wide in its West part, but considerably contracted between Shark Point and Point Boolambemba, and the bank of Mona Mazea still further narrows it.

The banks of the river, formed of alluvial deposits, are covered with mangroves, one species of which grows to a considerable size; it has a straight stem, sometimes 100 ft. high, supported by an arch of roots, which rise as much as 20 ft. from the ground. The spaces between the giant mangroves are filled with various kinds of trees of smaller growth, among which are a good many palm trees. Other parts of the banks are lined with common mangroves of low growth. The country near the river is low and marshy; but at some distance inland may be seen some wooded hills. Shark Point, which is covered with tall mangroves, of which we have been speaking, is considerably higher than the land on the right and left of it.

There are two seasons on the Congo, the dry and the wet. The dry season is from April to September. The first rains commence at the end of September, and continue to the middle of October. This is the time for preparing the ground for planting. The second rains commence in November, and end in January. They are very heavy, and are attended with great heat. The third rains continue during the months of February and March, and are very heavy, with violent tornadoes and storms.

The rising of the Congo occurs six weeks after the commencement of the rainy season, that is, about the middle of November; it then rises 8 feet 9 inches above its ordinary level. The stream becomes very rapid, and bears along with it floating islands, formed of the roots of plants of all kinds, covered with bamboos and grass; these are very dangerous for ships under way, and especially for those at anchor. Some of them are more than 100 yards long.

The rains, no doubt, have much to do with the rising of the river; still we do not think they are the sole cause of it, but that it may be partially attributed to the strong sea breezes which blow at this period, and necessarily contribute to retard the flow of the waters, and to dam them up, as it were, in the upper parts of the river. Indeed, in the years 1845-6-7, the rains were very trifling on the Congo coast, yet the Congo did not rise the less, though it was not so strong as usual.

It is a subject of regret that navigators, who have had occasion to enter the Congo, and to remain there some time, have not furnished us with more information about the tides. For all our researches, we can only give a few observations, which are far from being sufficient. We will speak first of the currents outside the mouth of the river.

The waters which come from a river, in running out to sea, usually diverge somewhat from the original course, and join the general current which sets along the coast, at a certain distance out. The point of junction of the two streams varies, as to its distance from the entrance of the river, according as the waters of the latter have more or less speed, or the current itself is more or less strong. Although the rise or fall of the level of the waters is often perceptible at the junction of the streams, the effect of the tides is not more marked than usual.

At the mouth of the River Congo, the commander of the French frigate *Vénus*, on a voyage to Kabenda, in 1784, mentions having felt a strong current about 21 miles out, to the North of Cape Padrao. Being at anchor in 20 fathoms, the current was estimated by the log to set at the rate of 3 miles an hour towards the N.N.W. In the centre of the stream of the Congo, the captain of the *Vénus* estimated its rate at 6 miles an hour; and at the time he was off the entrance of the river, the stream constantly set out of it, notwithstanding the effects of the tide. This observation is important; and we shall see, hereafter, how it may be turned to account.

Off the mouth of the Congo, beyond the distance of 35 miles, the currents set to the N.N.W., North of the parallel of Boolambemba; to the W.N.W. on the parallel of the point; and to the S.W., South of the parallel of Cape Padrao. Their speed is very variable, and often attains, even at this distance, a rate of 3 or 4 miles an hour. Sometimes, at spring tides and in the dry season, the strength of the current may be crossed without feeling its influence.

The waters off the Congo are very much discoloured with a yellowish red or brown tinge; they are covered with foam and rubbish of every description. Very frequently South of Cape Padrao, along the shore the sea is very much agitated, and shows in overfalls. At 40 miles out from the mouth of the river the waters become of a dark and blackish tint. They are brackish at this distance.

You must not enter the Congo River without a commanding sea breeze, which usually rises about 9 or 10 in the morning, and blows from the S.S.W. to the W.S.W. The stream in the river has been found, as we have said, to run at the rate of more than 5 miles an hour. The direction of the stream is from Point Boolambemba on to the Mona Mazea Bank, and runs along the coast up towards Red Point. Its course on this side is then North, or N.W., or N.N.W., when near the right bank of the river. In the middle of the river, between Point Boolambemba and the left bank, the stream sets to the West; and near the left bank it appears to follow the course of the bank, *i.e.*, West or S.W. In Diegos Bay, which is an indentation of the left bank, South of Point Shark, it sets towards the North as far up as this point, which it rounds, and on the meridian of which it takes a W.S.W. direction. Within the river, above Point Boolambemba, the current follows the direction of the banks.

Moreover, in the Congo, a rapid surface current, and an under one running in an opposite direction, is sometimes found to occur. In the instance in which this was observed, the ship, being becalmed, and drifting with the stream, was only carried at the rate of 1 or 1½ mile an hour, although the surface current appeared to be moving at the rate of 4 or 5 miles.

There is no mascaret (bore) or *pororoca* at the entrance of the Congo, since this river appears to have at its mouth a bar, on which there is probably a depth of 20 fathoms, according to Capt. Owen. At 13 miles from Cape Padrao, the greatest depth that this officer found was 44 fathoms.

At the times of new and full moon there are dangerous tide races, which cause the sea to break violently on a portion of the Mona Mazea Bank.

FRENCH POINT is the southern termination of the Banana Peninsula, which is a narrow sandy spit 2 miles long, forming the western point of the opening leading to Banana and Pirate Creeks. The point is surrounded by a bank of sand and rocks, which extends in a southerly direction three-fourths of a mile, with deep water close to its edge, whilst on its western side the 3-fathoms line runs out to a distance of 1¾ mile from the point. Near this latter position the flood stream is occasionally felt, and vessels obtain temporary anchorage in from 4 to 8 fathoms. The South end of the bank is marked by a *buoy*, moored with the South extreme of mountain range E. by N. ¾ N., and Boolambemba Point, S.E. ½ E., but owing to the rapid currents it is frequently washed away. In the event of its not being in position, the outer edge of the bank will be cleared by bringing Boolambemba Point to bear S.E. ¾ E.

BANANA and PIRATE CREEKS.—These two streams fall into the sea between French and Boolambemba Points, and are the outlets of a branch of the Congo communicating with Monpanga Islands, through which in former times slavers proceeded. Good anchorage can be obtained in either for vessels of small draught. A pilot is necessary, and invariably comes out when a vessel is seen to be approaching the entrance.

There are two Dutch factories on Banana Peninsula, each being distinguished by a flagstaff, and nearly abreast of the southern of the two is the coaling wharf, alongside which at low water there is a depth of 10 to 12 ft. There is good anchorage off the lower Dutch factory in 3½ or 4 fathoms, and vessels drawing 18 ft. can enter. There are several small steamers here engaged in the river and coast trade.

Coal can always be obtained at Banana Creek, at contract price, for the use of H.M. ships; and, as a coaling station, this place has been found most convenient. Haul off from the coaling wharf at night, or the vessel will be boarded by rats. The vessel should be well moored and fastened to prevent being carried away by the floating islands which sometimes descend the river.

Bullocks of a superior quality, though small, may be obtained from Moanda, about 6 miles northward of Banana. Deer, guinea-fowl, partridges, bustard, quail, with green pigeon and doves, abound, but are difficult to bag for want of dogs.

Point Boolambemba, also called *Fathomless Point*, is a low point, with a clump of trees a little higher than those around on its southern part. Beyond this point is seen the plain of the River Congo, running E. ½ S., low, woody, and intersected by numberless creek or rivulets.

A little inland a range of hills runs parallel with the shore from Red Point to Point Boolambemba, in a line with which it terminates. These hills, which are moderately high, appear from the offing to form the shore, which at their foot is lined with thick trees. Some single, scattered trees are seen on the top of these hills. With Boolambemba Point bearing E. ½ N., and Shark Point S.S.E., at a distance of 18 miles from the former, the low coast is just distinguishable by the line of trees upon it, which have open intervals here and there. But to the right is very distinctly seen the rounded and pretty steep declivity which terminates the hills in the interior.

More to the South is seen the low, woody country of the left bank of the river, the trees appearing in the water at this distance; then, on the right, Shark Point is easily recognized by its tall mangroves.

Shark Point, as we have stated, is the extremity of a kind of peninsula, low, and covered with trees, which stretches out to the E.N.E. from Cape Padrao. Some lofty mangroves form a clump, remarkable for their height, at the extremity of this point.

To the eastward of Shark Point the coast trends inwards, and forms a bay, which is filled by banks with only 9 ft. water on them. There is a narrow channel through them, caused by the flowing of several watercourses into the bottom of the bay, which is called *Sonhio*, or *Diegos Bay*.

Shark Point is steep-to, and near the sandy beach which skirts it you find 7 fathoms, then 26 fathoms. But a little to the East of its meridian you find, quite close to the sandy beach, 2 fathoms; and in its eastern part 4 and 5 fathoms close in-shore. You can pass it within one-third, or even one-quarter of a mile. At about 9 miles S.E. by E. of Shark Point is *Trade Creek*, where cruisers can procure fresh water from the river, and wood, ready cut, from the natives.

At 2⅔ miles to the W. by S. ¼ S. of Shark Point, the shore forms a gently rounded eminence, covered with tall trees, called *Turtle Corner*, and 3½ miles W.S.W. from this point is Cape Padrao. Between Shark Point and Turtle Corner, the land forms a slight indentation, called *Turtle Cove*, abreast of which the 10 fathoms bank of soundings extends a mile off, forming a good anchorage, and the natives at Shark Point will bring off goats, fowls, fruit, &c.

CAPE PADRAO, or Padron, when seen from the North, 7 miles distant, has the appearance of a perpendicular cliff, which runs down to the beach; just above the beach are some woods. The cliff forming the cape rises rapidly, with a rounded elevation, and its summit is covered with a stunted vegetation, apparently of grass and brushwood. The colour of the cliff is remarkable for its rosy tint rather than red. Cape Padron is called by the Portuguese *Mouta Secca*, or Dry Thicket Point. The land of Cape Padrao is low, and the sea washes the foot of the cliff. All the shore is safe hereabouts, and you can cruise along it in 10 or 13 fathoms.

A fortified Portuguese post stands near Cape Padrao, and is called *Porto Pinda*. As it now stands, it was established in 1855, and is subject to Ambriz, but it had been an early settlement of the Portuguese.

Directions for entering the Congo.—When you come in sight of Cape Padrao from the South, you may see to the N.E. the land on the right bank of the river. From a distance you may often fancy you see a town and houses built in a semicircle, an illusion caused by a confused mass of rocks, which have this deceptive appearance. From Cape Padrao the land slopes down to Shark Point.

Between Point Boolambemba and Shark Point the entrance of the River Congo is well defined, and is, as we have said, 7½ miles wide. The right bank of the river then takes an E. ½ S. direction, forming at Point Boolambemba a very acute angle, the left bank being nearly parallel to it. In nearing either bank the depths vary from 6 to 8 fathoms, except near Point Boolambemba, where there is no bottom at 93 fathoms, one-third of a mile out.

In mid-channel where no bottom was found, with 80 or 100 fathoms of line, at the mouth of the river, the strength of the current renders the navigation very difficult, and sometimes even dangerous. It will, therefore, be always prudent to get a local pilot, from Kabenda or elsewhere, to take the ship into the Congo.

When you want to go any distance up the river, it will be necessary, whichever direction you come from, to keep close along the left or South bank; so that, coming from the North, you will have to cross the strength of the stream. We will explain how this is to be effected, so as not to be driven out to sea by the current.

Coming from the North, it will be sufficient, to enable you to cross the stream, to have a fresh and settled breeze from the S.W. or W.S.W. When we speak of out at sea, we suppose that you are 150 or 200 miles from the coast, at which distance it is said that the current from the Congo attains at certain periods a rate of 2 or 3 miles an hour. It is not known at what distance this current, which usually has a N.W. or N.N.W. direction, becomes united with the Atlantic current, which sets along the coast from the Cape of Good Hope; but as the latter has a speed of not more than 24 or 26 miles in 24 hours, it is possible that the current of the Congo may be felt at a very great distance.

The second course for crossing the stream in coming from the North, and the one generally taken, is to tack along the shore between Kabenba and Red Point, without leaving the bank of soundings. When you have made Red

Point, then anchor, if you find you cannot make way. But if the sea breeze is favourable, you must calculate so as to get clear across the stream while this breeze lasts, and to reach the left bank of the river before it drops. So that even if you have reached Red Point, and are not sure of having time enough to cross the current, it will be much better to anchor somewhere off the point, and wait for the sea breeze next day, and then to weigh as soon as it is well set in. This breeze usually rises about 9 or 10 o'clock in the morning, and blows from the S.W. or W.S.W. till evening.

If you only want to proceed down to the coast to southward, without entering the river, after you have got across the stream, you will keep on your course as long as you have a fresh sea breeze; and in case it is nearly ceasing when you have traversed the current, the better way will be to anchor to the S.W. of Cape Padrao, 3 or 4 miles out, according to the distance you have got from the mouth of the river, and there wait for the next day's sea breeze to carry you on along the coast southward.

In this course you must steer in the following manner: on leaving the parallel of Red Point, at a distance of 9 miles from the point, set the head of the vessel on to Shark Point or Cape Padrao, as far as the parallel of Pirates' Creek. Here the stream sets to the N.N.W., and it will be sufficient to coast along about 9 miles out to clear the Mona Mazea Bank in 10 or 11 fathoms, in which depth you should keep; the course will be about S. by E.

Then when you get on a line with Pirates' Creek, or even before, according as you feel the force of the current greater or less, or a tendency in it to set towards the W.N.W. and West, bring the vessel up as if you intended to enter the river, steering right for the middle of the open space between Point Boolambemba and Shark Point. You will in this way get across the strongest part of the stream, and when you bear up for the left bank, haul your wind and steer so as to be carried on the South shore, till within 3 or 4 miles, and then anchor as you please.

If you want to enter the Congo, you must still anchor to the S.W. of Cape Padrao, and await the sea breeze to carry you in; unless you are in time to double Shark Point, and to anchor on the left bank to the East of this point.

You must never attempt to cross in the evening, for it is seldom that you would in this case have time to clear the main stream during the continuance of the sea breeze; and if it were to drop before you reach the left side, you would inevitably be carried out to sea.

Coming from the South, when you have sighted Cape Padrao, you may bring up 3 miles off, which may be done without danger. If you arrive at night, anchor to the S.W. of the cape, and wait till morning for the passage across. As soon as the sea breeze becomes settled, then weigh, and with the cape bearing E.N.E. or N.E. by E., you will be in the most advantageous course for clearing the stream. Keep this course till you begin to find yourself in the bed of the stream; then bring the cape astern S.W. by S., or S.S.W., and keep the lead going, to be sure of the moment you get on to the Mona Mazea sands on the right bank.

When you are going to Kabenda, you must keep off the Mona Mazea bank; and on leaving the Congo, run out to sea for about 20 miles from its mouth, before you put the ship's head to the North, in order to avoid the bank. You must also take notice of the current which sets to the N.N.E. at the rate of 1 mile an hour, sometimes more, according to the strength of the wind.

Near the outer entrance of the estuary is *Banana*, or *French Point*. At 11 miles above Boolambemba Point, also on the North side, is *Bull Island*, a clump of trees, the Rhinoceros Island of Capt. Vidal's chart.

Steamers going to Banana Creek from Shark's Point should steer for Boolambemba Point, keeping the South point of the mountain range at the back of Banana bearing E.N.E., or to the northward of that bearing, to guard against being set on to Mona Mazea Bank by the current; for, although heading for Boolambemba Point, the vessel will steadily be set toward the anchorage, and it will be found best to keep her heading well up to the current; by slowing down the engines or by shortening sail she will readily drop to the anchorage, which should be approached by the bearings and keeping the lead going. In crossing over to the anchorage off French Point or to Banana Creek, there is danger of being set by the current on to Mona Mazea Bank, or on French Point Spit, and as the strength of the current varies with the state of the river and with the tides, a stranger unacquainted with the landmarks and bearings will find it advantageous to employ the local pilot, who can always be obtained by the usual signal.—*Naut. Mag.*, *November*, 1879, p. 988.

Brief directions for entering this river, are given by Capt. Vidal, R.N. —It is necessary to approach the river from the southward, and anchor near Point Padrone, until the sea breeze sets in strong enough to stem the current round Shark's Point, and proceed up, keeping the southern shore aboard. Latitude of Shark's Point, 6° 4′ 36″ S., long. 12° 17′ 30″ E.

H.M.S. *Ariel*, in March, 1875, drawing 10½ ft., had, in proceeding up the Congo to Embomma, not less than 4 fathoms water from the sea to Puerto da Lenha, and 3 fathoms between Puerto da Lenha and Embomma. The passage between the two latter places should not be attempted without the assistance of a pilot; the Dutch trading house at Banana can generally supply one.

Puerto da Lenha, formerly a famous slave shipping port, is 12 or 13 miles above Bull Island, and stands on the point projecting from the North shore, marked Tall Trees in Captain Tuckey's chart of 1816. This is at the head of the estuary, and above this may be considered the true delta of the mighty Congo, which, although navigable, does not belong to ocean navigation.

The land between Shark Point and Puerto da Lenha appears to be formed of innumerable islands, and the whole country in this locality may be described as a network of creeks. On the dry spots on the banks of the creeks are many small native villages, inhabited by a people named Missilonghis, who are the pirates of the Congo, and subsist almost entirely by plundering the boats belonging to Europeans proceeding up the river from Banana to Puerto da Lenha.

Puerto da Lenha is a station for European factories; the ground on which the factories are built has been reclaimed from the swamps and river. There is no communication between these factories except by water. The station is infested with large pythons, which commit great ravages amongst the sheep and fowls of the factories; upwards of three hundred of these reptiles have been killed in one month.

Above Puerto da Lenha the scenery rapidly changes in appearance; the dense woods disappear, and are replaced for a distance of 25 miles by low flat ground covered with fennel and coarse hippopotamus grass. Fetish Rock is the termination of a ridge of iron stone, and is held sacred by the natives in consequence of the immense quantities of gum copal lying under the surface; this valuable article of commerce cannot be removed owing to the superstition of the natives.

The land in the neighbourhood of Embomma is hilly, and covered with coarse grass; the factories are simply storehouses for produce received from outlying trading stations. The chief articles of trade at the market are small dried fish and empty bottles.

Captain Burton says:—On August 31, 1863, we made sail from Banana or French Point. Our party consisted of Commander Perry, R.N., Mr. Bigley, R.N., and five petty officers, myself and Steward Salim Agha. We ran up the right or northern bank, which is here, as in the oil rivers of the Biafra Bight, a mass of thicket and mangrove, of palms and pandanus, and anchored for the night off Bull Island, distant 6 or 7 miles. Even this the debouchure of the river greatly requires re-surveying; there is hardly a portion to be relied upon, and the delicate questions of the tides and of the under-current, which at times in most places run counter to the surface stream, remain to be settled. And here it may be remarked that, with due prudence, and by taking advantage of the reflux caused by the flood tides damming up the mouth—a phenomenon which extends to the rapids—small steamers might easily, and at all seasons, ascend to within musket-shot of the *raudales*, or cataracts.

On September 1st, we passed the last mangrove, showing that the saline influence extends no further. We remarked sundry factories, one-storied buildings of plank and thatch, peeping from holes cut in the densest bush, and most unwholesomely situated. They serve as videttes and outposts, enabling slavers to ship below the difficult passage around Palm Point, and they command a straight reach and a clear view to the river's mouth. Moreover, those on the South bank (also three in number) facilitate overland transit to Mangue, Ambrizette, Ambriz, and other ports.

After 22 or 23 miles from Banana Point, with a 3-knot current against us, we landed at Porto (or Puerto) da Lenha; on our latest charts, *Ponta de Linha*, three errors in three words. The vile site is on the right (or North) bank of the river, whose valley here is 5 miles broad; the water is fresh, and when taken a few miles up is fit for drinking. The settlers, beaver-like, must protect their dam with strong piles, and a rise of 4 or 5 ft. inundates their foundations. The port dates from the second decade of the present century. Captain Tuckey knew it only as "Tall Trees," and ships loaded without landing. There are sixteen factories, but only *two* legal traders. Above Puerto da Lenha the mighty river divides into three parallel branches, separated by the isles and banks, which frequently change; the northernmost (or Maxwell River) is the Nka'nga'; the central (Mamballa of the charts) is called Nshibul; and the southern is the *Sonio* or *Sonho* of the charts.

Capt. Burton ascended the river above this to the Yellala Rapids, restored in health by this delightful region, in September, 1863.*

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* Vide Consular Reports Parl. Papers, 1865, vol. lvi., pp. 216—224

After adventures and observations Capt. Burton reached the Great Rapids. In conclusion, he observed that, above those rapids, the grand river forks. There is a north-eastern branch, which has been represented as flowing from a lake. The information he obtained at the rapids left him no doubt of the fact. In the previous year, when he visited the source of the River Gaboon, he was informed by the Fans, that after eighteen days' travel towards the East, they came upon a water flowing to the right or southward; this may be the north-eastern fork of the Congo. The south-eastern branch of the Congo, Captain Burton firmly believes, is the Coango and the Casai, which Dr. Livingstone crossed near their head.

Boma, meaning the snake, and erroneously written *Embomma*, is at the head of the Congo delta, about 61 miles from the entrance. It is 6 miles below the place marked as such by Tuckey, on the North bank of the river. It is delightfully situated, the air dry and healthy. It is the depôt between the interior and the coast, and has been one of the greatest slave marts in the world, either in the form of the *real* slave trade, or its legalised traffic known as the French immigration scheme, now abandoned. Boma is said to be 273 ft. above the sea level.*

Mr. H. M. Stanley was very hospitably received at Boma, in August, 1877, after his descent of the Congo or Livingstone. He describes it as containing about half a dozen Dutch, French, and Portuguese factories, lining the river front, and under the management of about 18 white people.

We give the following directions for the navigation of the river, but as the banks are liable to great changes, implicit reliance must not be placed on them.

Directions *by Captain Tucker.*—The passage up may be made at all times of the day, with the flood tide, or against the ebb, if the sea breeze be strong enough. The best time for a stranger to make it is certainly with the first of the sea breeze; though, on taking H.M.S. *Wolverine* to the shoals a second time, I went up in the afternoon, and on the third time I went up in the evening, passing the lower shoals, and anchored at 8 p.m., close to a slave vessel lying between the two lower shoals.

The passage up should be made on and close to the left bank, until you arrive at the lower shoal, about 20 miles from the mouth of the river, where a spit with 2, 1¾, 1½. and 1 fathom on it runs off the left bank about a cable's length, which shows itself at low water, by the smoothness of the water on the lower part of it. From thence you should steer diagonally across the river, keeping her head well up, for a low, sandy, and green island on the right bank, keeping close to the lower edge of the lower shoal, in 7, 8, and 9 fathoms, until you arrive near the island, when you must steer up close to the right bank, carrying your lower studding sail booms over the bushes, having 6, 7, 8, 9, and 10 fathoms, except a small shoal with 4 fathoms, when you must edge off a little, so as to pass it about a vessel's breadth from the bank. Then you must steer along the bank again until you arrive off Puerto da Lenha, and anchor in 4 and 4½ fathoms, a mile above which the river is not navigable for vessels.

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* The system adopted in trading or bartering with the natives on the coast comprehended between the River Congo and Ambris is somewhat complicated and curious. All produce, except ivory, on being brought to the trader is put on the scales, and the price is agreed, in "longs" in English, or "pegas" in Portuguese. The "pega" or "long" is the unit of exchange to which all the multifarious articles of barter are referred.—*J. J. Monteiro.*

The passage down is rather dangerous: but I think, by attention and prudence, it may be always made with safety. The usual passage down the river is crossing to the left bank above the shoals, and passing between them and the bank; but should only be attempted with a commanding sea breeze, with which, even, it is necessary to keep the ship's head well up the river, and allow the stream to set you gradually down until you gain the left bank; when you must drop down close to the bank in 4, 3½, and 3 fathoms, either by kedging or under sail. I prefer the latter.

The danger in crossing the river in coming down arises from the wind falling or lulling, and the vessel, in consequence (if not brought up very smartly with her anchor), being set by the stream upon the upper edge of the shoal, which has caused the total loss of many vessels, and the loss of rudders of many others. In light winds I should therefore recommend the vessel to be taken down by the sweeps, on the right bank, with the kedge ready to be dropped, and the boats down ready for towing, until you arrive on the lower edge of the lower shoal; when, if there be no sea breeze, it will be necessary to bring the vessel up with a bower anchor in 7, 8, and 9 fathoms, to avoid the shoal running along the right bank, over which the stream sets with great force. But if the sea breeze be commanding, you may cross over to the left bank by keeping the vessel's head well up the river until you get well over; when you may either back, or fill, or work down, standing from 4 fathoms on the left bank into not less than 7 fathoms on the right bank, until past Boolambemba Point and Spit, when you must not stand into less than 4 fathoms.

With respect to the shoal of 3½, 3¼ fathoms, on the *Mona Mazea Bank*, in the mouth of the river, which I have laid down, I am of opinion that it is of a very late formation, and will prove very dangerous to vessels crossing the river as I did. Steering well up the river from the southward to cross over to Cape Padrone, carrying 7 and 8 fathoms, I suddenly got into 3½, 3¼ fathoms, along which I ran, carrying 7 and 6 fathoms on the port side, and 3½ and 3¼ fathoms on the starboard side, for about more than three ships' lengths.

I am of opinion that the whole of the Mona Mazea Bank is rising fast, from the deposit of mud out of the river, and from the sand thrown over by the heavy swell which often sets in upon it.

To proceed up the river.—The passage up should, according to some authorities, be close to the left, or southern bank of the river; although others recommend the northern shore, where the sea breeze is said to be stronger than on the South side, where the vessel is necessarily under the lee of the tall trees. In vessels of large draught the service of a pilot should be obtained, if intending to proceed to Puerto da Lenha.

The following directions are by Staff-Commander H. H. Hannay, H.M.S. *Active*, and Navigating Sub-Lieutenant C. E. Pritchard, H.M.S. *Ariel*, 1875, but must be considered only as applying to the river at that time.

Proceeding up the river keep about a cable from the North bank of the river till Bull Island is passed; in this track the vessel will be out of the strength of the current, and have not less than 5 fathoms water; the same depth will be found at a quarter of a cable from Bull Island; then keep the North side of Bull Island in line with Active Point (Monpanga Islands) till Palm Point is just open of Henderson Point. When within 1½ cable of Henderson Point haul out till the small Bull Island is showing just between Bull Island and the main; and when abreast Henderson Point (a little West of two high conspicuous trees), steer S. by E. ½ E. across the river with a high single tree well open of the port bow.

When Boolambemba Point comes in line with Scotchman's Head, keep it so till the vessel is abreast of the high tree; then steer in till Scotchman's Head is just open of the point to the westward of the Dutch and Portuguese factories (Spiteful Point). Steer with these marks in line till the East end of Grass Island is in line with a double-headed tree which is situated just to the westward of Manuel Vaca's Town, on a N.E. by N. bearing; then steer for the grass patches just below the clump of trees on Drapers Island, and when a cable from the bank keep at that distance, with the palms a little on the starboard bow. Care should be taken to avoid the shoal which lies S.W. of Drapers Island. From abreast the palms keep midstream for Puerto da Lenha. In the channel now described the shoalest water found was 4 fathoms, about 3 cables from Henderson Point, in crossing the river.

Parker Patch, eastward of Henderson Point, has extended 3 cables down the river, and the channel between the patch and the North bank of the river is now only navigable for vessels drawing less than 6 ft. It is advisable to anchor as close as possible to the factories at Puerto da Lenha, the bank of the river being steep-to, in order to avoid the floating islands which come down in great numbers.

General Remarks on the Navigation between Biafra and Congo.—The navigation between the Bight of Biafra and Congo seems to have been very imperfectly understood, owing to a general ignorance of the setting of the currents and local circumstances. The currents of the bight are clearly variable. On the East of the islands the stream has been described as setting to the South; while at Prince's Island a north-westerly current on the East, and a more northerly current on the West, are occasionally found. A northerly current is also described as prevailing on the coast, all the way from Cape Negro, in 17° South. The following extracts from the Narrative of Captain Tuckey's Voyage will show the necessity of keeping clear of the bight and attempting a more direct passage from the West, when bound to the coast of Congo, &c.

On the expedition to the River Zahir, the ship *Congo* had Prince's Island in sight, 16th May, 1816, at the distance of 36 to 42 miles. From the spot whence the island bore *S.E. by S., true*, at that distance the ship, with light airs from the South to S.W., attempted a southerly course, but a strong current setting to the northward impeded it. On the 19th, at daylight, St. Thomas's was seen bearing *S. by W., true*, 36 to 42 miles. The island was in sight for two days, the ship making scarcely any way to the southward. She then stood to the westward; but the wind and current still continued unfavourable, and she did not succeed in getting to the southward of St. Thomas's until the 27th, having been obliged to stand to the westward as far as the meridian of 4° East, and at length passed only about 12 miles to the southward of the island. Observations here gave for the position of the Isle Rolas, the Equator, and longitude about 6° 45′.

The ship continued working to the southward, taking every advantage of the wind, and frequently trying for soundings, without obtaining them, until the 3rd of June, when at noon 17½ fathoms was found, with greenish oaze. Here the coast was seen; the latitude 2° 10′ S., computed longitude 9° 29′ E. The land was about 12 miles to the eastward. The weather was hazy, so that no remarks on the coast could be made. It was, however, inferred that the bank of soundings here does not extend farther off than 30 miles. At 10 or 12 miles off shore there was 18 fathoms, with greenish oaze; thence *S.W. ½ W., true*, 5 miles, 30 fathoms, coarse sand; thence *S.W., true*, 3 miles, 47 fathoms, sand and broken shells; thence *S.W. by W., true*, 4 miles, 67 fathoms, same bottom; and thence *S.W. by W. ½ W., true*, 4 miles, no bottom with 100 fathoms.

From the 5th of June the *Congo* continued to work out of soundings, but making very little way to the southward, until noon of the 17th, when she gained the latitude of 3° 12′. Running hence *E. ½ S., true*, 12 miles, soundings were gained in 66 fathoms, coarse brown sand, with red specks.

On the 25th of June, at noon, the ship had gained no more to the southward than to 3° 49′ S.; on the 26th, to 4° 8′; on the 28th, she was in 4° 24′. Some observations on the coast were now made; but they are too inaccurate for admission. On the 1st of July the ship was off the South point of the River Louisa-Loango, then bearing *E. by N. ½ N., true*, 7 or 8 miles. The current here ran N. by W. about three-quarters of a mile hourly. On the 7th the ship had arrived in the Zahir.

Captain Dalzel's Directions state, that vessels sailing from Cape Lopez to Kabenda or to Congo River are continually tacking and veering, being obliged every evening to come to an anchor. The practice is, in the morning, so soon as daylight, to put off, and keep to seaward till 11ʰ or 12ʰ, when the wind is South or S.E., and also when it is still. If then it does not change, a vessel loses ground, although in 80 fathoms of water. In this case, get up again with anchors; but when you come below anchoring ground, you cannot gain the river; and it would even be very difficult to pass by the entrance of Kacongo River, as the current sets there most part of the year to the N.W. and N.N.W.; and though, from March to September, when the S.S.E. winds are blowing, the currents may run toward the S.W. by S., yet it is advisable to keep off as before, and even farther. The sea during that time falls with greater violence against the shore than at any other season of the year.

Capt. Matson says:—"To cross the stream of the River Congo from the northward, it is requisite either to go 200 miles off shore, or to keep in anchoring ground. I always choose the latter. If you are not certain of getting across the stream before the sea breeze dies away, anchor on the Mona Mazea Bank, in 6 or 7 fathoms, until the following day, when a two hours' sea breeze will take you to the southward of Shark's Point, and you are then out of the influence of the stream, which always runs to the N.N.W."

Along this coast, between Cape Lopez and River Congo (says Pimentel), it is not fit to sail but in the morning. So soon as the wind comes from the

South toward the land, you go to seaward for twelve hours; and if it does not change, come back again to the shore, where almost everywhere you will have 8 or 10 fathoms of water. As the current all along runs much to leeward, N.W., and W.N.W., should you perceive it setting to the S.W., the best way is to take a trip to sea two hours before daylight, and then to return and anchor near the land. Any other method would make it very difficult for passing the River Congo. The current being to leeward, when you turn about to sea, with the wind at West, or W. by S., and your ship halfway, it is advisable you should come back to the land, to anchor in 10 or 12 fathoms, oazy ground, which you will find in all this part; and if the wind should happen to blow from the S.W., you are to turn toward the sea.

The COAST from Cape Padrao to the River Dandé is about 156 miles in extent to S. ¼ E. It is of moderate elevation in general, but nevertheless higher than that we have thus far described. It also becomes more rocky at its base, and in some places it presents reddish cliffs, surmounted farther inland, and chiefly towards the South, by a second line of hills. The line of soundings, 2 or 3 miles out, is also less regular; but still the coast is generally safe. It is sometimes wooded; sometimes with naked hills, merely capped with isolated clumps of trees. This is the general aspect.*

From Cape Padrao to *Cape Engano*, or *Deceit*, the coast runs S. by E., 21 miles, nearly in a straight line. We have described Cape Padrao, as seen from the North, and remarked the rose-coloured or reddish cliff which distinguishes it. When seen from the West, it presents rounded undulations; the summit of the hills being covered with a poor and stunted vegetation. After doubling Cape Padrao the cliff disappears, and is replaced by a low coast, gently undulating, on the top of which, in some places, are some very straight lines, and here and there tufts of brushwood. When you get 3 miles to the South of the cape it looks low, and slightly projecting. Some bright red cliffs are seen hereabouts, tolerably high, and continuing for a long distance without any break. They show very little vegetation. Shortly after, the coast changes in appearance, and becomes arid, rather high, and retreating from the shore; here and there are seen red cliffs. The steppes which form these hills are marked by lines of trees and brushwood, and are sufficiently high to be easily recognised. They are called the *Barreiras Vermelhas*. Along this part of the coast the sea is generally very rough.

Cape Engano (Deceit) presents nothing remarkable; it is slightly prominent, and to the East is seen a small conical hill. The red colour of the cliff which forms it has no doubt been the cause of its being mistaken for Cape Padrao; and to this perhaps it owes its name.

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* There is some confusion in the nomenclature of this coast arising from the imperfection of the older charts. M. de Kerhallet, from whose work we have taken much of the subsequent description, has, by comparison of numerous authors, settled on the arrangement which has been partly followed hereafter.

From Cape Engano the coast curves inwards gently, and forms a bay, the South point of which is called *Margate Bluff*. This point, situated 6 miles S.S.E. from Cape Engano, is projecting, of a round form, rocky at its base, and crowned by a tolerably high hill. It is 27 miles distant from Cape Padrao. At Margate Bluff commences the high land, which continues southward as far as the Bay of Funta, or Fonda, a distance of 33 miles.

Margate Bluff is the North point of another bay, with a sandy beach, and showing near the middle of it a rocky headland, which terminates towards the South in a rather high point, distinguishable by a clump of dark green trees, in lat. 6° 39′ S., long. 12° 33′ E., called *Mangal-Grande*. It is 1 mile North of the South point of the bay, and marks the entrance of a small river, which runs amongst the small hills near the shore. The South point of the mouth of the river, which is also the South point of the bay, shows some lofty cliffs, pointed at top, with their summits covered with shrubs, and overtopped again by a mountain, the top of which is gently rounded and bare. This point is called *Mangal-Grande Point*, and here there is a factory. It is 37 miles S. by E. ½ E. from Cape Padrao. At 2 miles northward of Mangal-Grande is a factory, consisting of two houses, called *Massemodom*, between which and Mangal-Grande the shoal water extends for a distance of 2½ miles from the shore.

Vesuvius Shoal.—A little over 3 miles W. by S. ½ S. from Margate Head is a shoal, with as little as 2½ fathoms water on it, a mile in length North and South, within the 5-fathoms boundary. Within the shoal an extensive bank runs out from the shore between Margate Head and the coast, 1½ mile to the southward, reaching to within about a mile of the East edge of Vesuvius Shoal. On this bank there are several very shoal patches, on one of which, with only 7 ft. water, H.M.S. *Hydra* touched in 1859. It is therefore absolutely necessary to preserve a good offing when passing in this locality, and not shoal the water under 8 fathoms. A rocky shoal of 2¼ fathoms is stated to lie 6 miles to S.S.W. of Margate Head.

From Point Mangal-Grande to the North point of the *Bay of Funta*, or *Fonda*, in lat. 6° 56′ 30″ S., long. 12° 48′ 52″, is 22½ miles, the coast trending to the S.S.E., and presenting, for a distance of 16½ miles, an uninterrupted sandy beach, with some factories on it. Behind this beach may be remarked here and there some rocky cliffs almost perpendicular, overtopped by some rounded hills, and almost bare of vegetation. At 6½ miles North of the Bay of Funta the sandy beach is interrupted for some miles, and the cliffs come down to the water's edge; but soon after the sandy beach reappears, and continues as far as the North point of the Bay of Funta, to the East of which runs the River Lelunda.

The two Portuguese factories at *Kacongo*, about 8 miles southward of Mangal-grande, are situated at the foot of a hill, and are not easily discernible; a short distance to the southward there is a clump of trees. About 5 miles southward of Kacongo are situated the factories of *Kinzao*, consisting of three houses, two of which are whitewashed. Between Kinzao and the point North of the entrance to Funta Bay, shoal water extends from the shore. The factory of Missanga is 5 miles southward of Kinzao, and good water may be obtained here.

The Bay of Funta, or Fonda, at the mouth of the River Lelunda, is 4 miles wide between its two points, both of which are low and sandy, the cliffs not appearing again till you get 4 miles South of the South point of the bay. The bay is not deep, and affords no shelter, being open to the S.W., and thus exposed to the winds from seaward. A reef runs out from its North point 4 miles southward, and must be carefully avoided when approaching from the North. You can anchor off the bay in 7 fathoms, with the entrance of the Lelunda bearing N.E. ¼ N., 5 miles distant. You may also anchor 8 miles off the river, bearing S.E. by E. A narrow bank of 4½ fathoms, 9 miles long, lies about 4 miles off the coast abreast of the bay, and must be carefully avoided during the season of rollers.

The mouth of the *Lelunda River* is indicated by some clumps of trees growing close to the beach, beyond which, to the South, are some cliffs and isolated trees. On the left bank of the river, 4 or 5 miles inland, are some trading huts; this bay was notorious for its slave traffic. About half a mile South of Lelunda River are the five factories of *Moculla*, where good water, and occasionally beef may be procured.

From the South point of Funta Bay the coast runs, with a slight curve, to the S. by W., as far as the entrance of the River Couza, or Cousa, which is 16 miles from the point. The beach is sandy for about 8 miles, and then the low rocky cliffs re-appear as far as the Cousa. At 4 miles southward of Funta Bay, above the scattered downs on the shore, which presents no longer that level surface which gave it the appearance of a red wall, you will see a rather high mountain; it is called *Funta Mount*, and has some low trees on its summit.

The hill stands a little inland, behind the land above the rugged cliffs of the coast, which lie behind the sandy beach. It is the last prominent hill rising above the line of coast, which becomes generally low, and remains so as far as the River Cousa. It presents a continuation of cliffs of uniform height, intersected here and there by what appear to be the outlets of torrents or ravines among the round-topped hills. When seen from 5 or 6 miles out at sea, the cliffs appear of a yellowish colour, almost like ochre, and sometimes reddish, when they look clear. They contrast strongly with the blue tint of the sea, and with the green level of the country behind them.

River Cousa, or Couza.—The entrance of the river may easily be distinguished by the tall trees about it, and by a gap in the cliffs we have been speaking of. To the South of the river these cliffs reappear, but less elevated, and their summit is flat. The loftiest trees are on the point of the right bank of the river, called *Point Palmas*, and their dark hue stands out strongly against the yellowish tint of the cliffs on the left bank. The South point of the entrance is skirted by a small bank, which runs 1½ mile out. To the East of the entrance is a group of hills, the highest and most southern of which is called *Cousa Hill*.

On the level land are some very thick clumps of trees, among which you may distinguish a village. Close to the sea there is an isolated hut upon the cliff, and behind this again some large trading huts. About three-quarte
of a mile southward of Couza River is the trading station of *Ambrisett*
stock can be obtained by giving a little notice. A rocky shelf exte
seaward, between the factories and Foreland Bluff.

At 5 miles S. by W. ½ W. of the North point of the mouth of

Couza is *Cape Juma*, or *Foreland Bluff*. The coast between is formed of cliffs, rising gradually. Foreland Bluff is itself formed of a high cliff, projecting seawards when seen from the South, but appearing less prominent from the North or West. The top of this cliff is covered with stunted herbage.

IV.—THE KINGDOM OF ANGOLA.

This country is also a Portuguese possession. It is so by right of discovery in 1485, by their Christianising it in 1491, and by re-conquest in 1569. At the first-named period, Diego Cam, sent by King Joao II. of Portugal, discovered and explored the Zaire, erecting the pillar (padrao), on its South bank. In the following year, after quitting the Congo, he went as far South as Cape Negro, planting two other columns, as hereafter noticed. The name is perhaps derived from that of the native conqueror under the Portuguese commander, Francisco de Govea, in 1569, *An-Gola*, the son of the Jaga of Matamba, Gola-Zinga.

On the Atlantic Coast it extends from the *Rio Ambriz*, or *Embrige*, or *Rio dos Ambres*[*] (amber or copal), to the *Cuanza River*, which separates it from Benguella. Toward the interior it reaches to the countries of the *Molluas*, *Jaga-Cassange*, and *Dala Quicua*. According to the approximate estimate, in the work of J. José de Lima, the total population of this kingdom was 246,000, of whom 1,740 only were white, including 154 women, but further particulars of the population will be given in the notice of Benguella hereafter. The country is necessarily very varied in its aspect, and the features of the coast will be subsequently described. The productions are cotton, sugar-cane, indigo, rice, coffee, cocoa-nuts, castor-oil seeds (vulgo carrapateira), gum copal (called *mucocoto*), tamarinds, tobacco, and urzella[†] of Angola. The kingdom of Angola is politically divided by the Portuguese into six presidios and four districtos, the capital being S. Paulo da Assumpçao de Loanda. The census of 1870 gave the population of Angola as 433,397.

CAPE JUMA, or Foreland Bluff, is the North point of the bay of the same name. Behind and beyond the land above the cliff is a group of hills, the southernmost of which, of a table form, called the Table of Juma, is the highest, and is the best mark for the Cape and Bay of Juma. It may always be easily recognised from whatever direction you approach it; at 25 miles off it always has the same appearance. South of Cape Juma the coast curves inwards gently, to form the Bay of Juma. This bay is 5 miles wide between its two points, and is rather a mere indentation of the coast than a bay. From Cape Juma the cliffs continue to be seen for a distance of 3 miles; they are lofty, peaked, and so little broken on their face, that they might be taken for a great white wall, were it not for some slight fissures on the very top of them. To these cliffs succeeds a fine sandy beach, extending as far as the South point of the bay, on which may be seen numerous canoes drawn up high and dry.

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[*] The limit of Angola to the North has been placed formerly at the little River Lifune (or Onzo); but the interior possessions do not accord with this limit, and therefore it is placed at the Ambriz River, as stated above.—(See J. J. de Lima's Ensaio, &c., livro iii., parte i., capit. i.

[†] This plant was first discovered in 1835, and in 1838 the first bales were imported into Lisbon. In 1845, above 8,000 quintals were exported. This *urzella* differs entirely in its nature from the *lichen rocella* and *orchilla* of the Cape Verdes and Canary Islands. That from Angola is a parasitical plant, growing on and destroying the trees.

AMBRIZETTE.—The Portuguese factory station at Ambrizette is a little North of this sandy beach, at the foot of the Table of Juma, to the S.W. of this hill, on the right bank of the River Ambriz, which falls into the North part of the Bay of Juma. The river appears to run eastward, and is a quarter of a mile wide near its mouth, which is barred by sand, like almost all the rivers on this part of the coast.

You can anchor in the Bay of Juma, with the table land of Juma bearing E. by N., 5 miles from land, in 9 fathoms, sand and gravel; or on the same bearing, in 6 fathoms, 3 miles from shore. On the parallel of the River Cousa, 9 or 10 miles out, you find 25 fathoms, bottom of muddy sand; at 18 or 20 miles, 40 fathoms, sand and coral bottom.

The neighbourhood of the Bay of Juma abounds in fish. The best depth for fishing is in 18 fathoms, gravel and coral bottom. In 4, 6, or 9 fathoms, muddy bottom, you find no fish.

From the South point of the Bay of Juma the coast runs S. ¼ W. for 14 miles as far as the point called Double-headed Cliff. For this distance the shore is throughout of white cliffs, high, and slightly undulating, forming at their foot numerous points, between which are small bays. Trees crown their summit; and in the second range there is, farther inland, a range of still higher hills, running parallel with the shore.

Double-Headed Cliff is a point projecting slightly, and only recognizable by some heights lying back in the interior, and near to it is the North point of a very small bay, along which the cliffs are very low; but they rise again high and abrupt at the South point of the bay, on which a cross is erected. This point is one of the most distinguishable on the Congo coast, by the hills which are seen a little to the South of it, and which serve as a mark for the shore, and the villages of Ambrizette, in the neighbourhood. These heights, called the *Aravat Mounts*, run 5 or 6 miles nearly parallel with the shore; they are rocky, steep, and have no vegetation but some brushwood. They are of a basaltic nature, and on the summit of the most northerly of them is a high peak of basalt, which is very conspicuous. More to the South, another rock has a fancied resemblance to the shape of the celebrated hat of the Emperor Napoleon. The slope of these hills towards the shore is very gentle, and it reaches it with undulations, in the hollow parts of which, in the midst of the trees, some huts are discernible. The neighbourhood of the hills appears to be thickly populated.

Near Double-Headed Cliff are the French factories of *Mussera Point*, off which the shore is foul for a short distance. From the anchorage the Pillar of the Aravat Mountain bears S.E. ¼ E. To the North of Mussera Point, half a mile from the shore, is a bank which [illegible] water. Between Mussera and Kinsembo there is a [illegible] the shore.

At 6 miles South of Doub[illegible] Ambrizette shore. Between the two points the coast is everywhere of whitish cliffs, terminating at the very point of Ambrizette. A sandy beach succeeds, and forms some slight indentations, which are improperly called the Bay of Ambrizette. This beach extends for 4 miles, and ends 2 miles to the North of a small river, called Rio Doce, situated 10 miles in a straight line from the peak of the Aravat Hills.

To the eastward of Point Ambrizette, (or Point Kinsembo), a short distance from the shore, and on the South slope of the Aravat Hills, stands *Kinsembo*, the principal village of Ambrizette, and some large barracoons or factories belonging to the Portuguese; another village and some barracoons are found more to the South, opposite the sandy beach. This one is in lat. 7° 44′ S., long. 13° 1′, according to M. Kerhallet. The southernmost of these villages stands near the end of the sandy beach of Ambrizette, 2 miles from the mouth of the Rio Doce. This village, the houses of which are of a conical form, is very striking, by its colour being brighter than the dark green of the trees which overhang it. The land hereabouts is of a yellow hue, and contrasts strongly with the green country which is seen South of the mouth of the Rio Doce.

RIO DOCE (*Loze*, or *Logé*), is an apparently insignificant water-course, and appears partially barred by sands. The North point of its entrance is low and very woody; and the wood which renders it most striking is of a very dark green colour. Above the wood some undulating hills are visible.

The South point of the entrance is high, and formed by a whitish cliff, which is surmounted by a green plateau. It is perpendicular; and on the summit are two palm trees, from which it takes the name of *Cape Palmas*, or *Bosquet*. It seems that these trees have been there a long time, for we find a similar name for this point on the charts ever since 1790, and the palm trees are also marked on them; on these charts it is called Point du Bosquet, or Grove Point. The entrance of the river is called by the Portuguese the *Porto de Sangano*.

The Rio Doce is very narrow at its entrance, and it seems to wind in a N.E. direction to the foot of the hills of which we have spoken.

The cliff which forms Cape Palmas is scarcely a mile in extent, and then the coast becomes sandy as far as the mouth of the River Loze, improperly called by Europeans, as M. Kerhallet says, the River Ambriz, which lies 5 miles from Cape Palmas.

The RIVER AMBRIZ,* which lies at the bottom of the bay of the same

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* Respecting the nomenclature which M. de Kerhallet adopts on this coast, differing, as was before stated, from that previously in usage, the following note in the Manuel de la Navigation, &c., page 135, will explain the variations which it is necessary to notice here.

"We here replace the correct names, to avoid the confusion which navigators have caused on this part of the coast, to which is owing a number of errors and mistakes.

"The River Ambriz falls into the Bay of Juma. The factories of Ambrizette are on this river.

"The River Loze falls into the Bay of Loze; there is no village of the name of Ambriz in the Bay of Loze; there are only the European factories.

"Lastly, the villages of Ambrizette are situated 26 miles to the South of the factory of that name, between it and the Bay of Loze."

In referring to the map drawn up by Capt. J. J. de Lima in 1846, to accompany his work name, may be recognized by the brighter green colour of the trees around its mouth; the trees are also loftier. This watercourse, formerly rather considerable, is now unimportant, and will scarcely admit small boats.

The North point of the Bay of Ambriz is low, sandy, and skirted by a bank, on which the sea always breaks. It is called North Breakers Point, or Point Loze, and lies 3 miles N.W. by N. ½ N. of the mouth of the River Ambriz. You should always give this point a berth of 2 miles, in order to escape the sandbank.

The South point of the Bay of Ambriz, 4 miles distant from the preceding, is called *Strong Tide Corner*. It is a high perpendicular cliff, of a whitish colour, and on its summit are some European factories. It has also some shrubs on its summit.

You must keep 3 miles to the West of this point, in order to avoid the bank which is said to run round it 2 miles out to the West, and on which the sea usually breaks very strongly. This same bank extends North of the point 2 miles out, and in some measure closes in the Bay of Ambriz on this side. Even very small vessels cannot moor on the East of this bank, on which there is 3½ and 4½ fathoms of water.

On leaving Strong Tide Corner and proceeding to the North, the bay runs in slightly, and shows a fine sandy beach as far as the River Doce. The shore is covered with tall trees and verdure. Above this line is discovered, some distance inland, a chain of hills running E.N.E., which appears to be a ramification of some more distant mountains running North and South. They appear to be of granitic formation, and are dotted here and there with scanty herbage and stunted shrubs. The Ambriz runs at the foot of these hills; the scenery on its banks is very grand. Numerous villages occupy the gentle slopes down to the river, the most remarkable and important being named *Koro*, *Kouanda*, *Kiverna*, *Baram-Poutou*, *Bonga-Bonga*, *Moundelé*, *Goundou*, *Vinda*, *Jouanna*, *Efouni*, *Kassi*, *Gombé*, *Antonio-Nasso*, *Serné*, *Embé*, and *Foula-Baman*. The River Ambriz, above the bar which encloses it entirely, is tolerably deep, and has 12 ft. water. It is navigable nearly to its source.

Coming from the North, in order to make this anchorage, you must round Point Loze, or Breakers, at a distance of 2 miles, and then cast anchor in 8 to 10 fathoms, mud, with the factories on Strong Tide Corner bearing S.E., and the mouth of the river East. Coming from the South, you must round Strong Tide Corner at a distance of 3 miles, and then proceed northward until you have the bearings as above, so as to avoid the bank around this point. The winds are generally from South to S.W. The current sets to the N.N.W. at the rate of 1 mile an hour. At this anchorage you have alternate land and sea

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on these Portuguese colonies, we find that the details, though somewhat imperfectly delineated, will accord with *previous* names, if our views are correct; thus, a few miles [illegible]
North of the River Ambriz, or Dos Ambros, in or about lat. 7° 40′, we find the [illegible]
marked as falling into the Porto de Sangano, and no notice taken of [illegible]
place it occupies. Therefore, presuming that Loge or Losa, wh[illegible]
nearly alike, is but a corruption of Doce, we have retained the [illegible]
sidering these latter names as identical.—*Ed.*

The word *Ambriz*, or, as the river is called by Pimentel, Do[illegible]
from the copal gum, resembling *amber*, abundant here.

breezes; and the roll of the sea being from the S.W., the vessel often gets across it, and consequently labours a good deal.

In order to land, you must first make for the entrance of the river, to within 100 yards of the shore; you must then run along shore to the foot of the cliff which forms Strong Tide Corner, where landing is easiest. It is always wise to do this, because on the bank to the North of Strong Tide Corner, although from 21 to 26 ft. is found on it, there is sometimes a swell heavy enough to capsize or swamp a small boat; and during the rollers which frequently set in, the sea breaks on the bank throughout its whole extent. At the anchorage in 7 fathoms, on the parallel of the entrance of the river, the waves begin to break at the distance of one-third of a mile to the East of the anchorage. As you proceed North of the parallel of the entrance of the River Ambriz, you can approach nearer to the land; and ships can anchor even in 20 ft., but it is dangerous, and the swell is then very strong.

During heavy rollers you cannot communicate at all with the shore; when they are less violent, landing may be effected by passing between the breakers on Strong Tide Corner and the shore. At the foot of the point the sea does not break, but a canoe is indispensable even for landing, on account of the surf, which is very strong.

East of the high land which forms Strong Tide Corner there is an immense marsh, extending many miles inland, on both sides the River Ambriz, which becomes navigable after passing this swamp. It renders the Bay of Ambriz very unhealthy, through its dryness in the fine season, and the mists which arise from it during the season of tornadoes. The sea reaches it at spring tides, and it abounds in fish. Sea birds also collect there in vast numbers.

By night the coast is covered with a thick fog, which fills the lower stratum of the atmosphere, leaving the sky perfectly clear. The dews are abundant, and the East wind is comparatively very cold.

At the anchorage in Ambriz Bay there is no fishing; you must go 12 miles out for that; but in the morning you may fish with the net at the mouth of the river. Fresh provisions may be obtained, being brought down by the negroes of the interior. There is no village on the bay itself. The lawful trade consists in ivory, skins, wax, gum copal, and some small quantity of copper ore. The illicit trade, and the most profitable, was formerly in slaves.

The small extent of coast comprised between Ambriz and the River Congo is a striking example of the wonderful increase of trade, and consequently industry, among the negroes since the extinction of the slave trade, and evidences also the great fertility of a country that with the rudest appliances can produce such quantities of valuable produce. In 1872 the exports from this coast, not including those from the Congo, comprised, amongst other produce, 1,500 tons of Adansonia fibre, 7,500 tons of ground-nuts, 1,000 tons of coffee, &c., estimated at over £300,000 in value.—*J. J. Monteiro.*

There are in Ambriz Bay two English, two American, one French, and several Portuguese factories, built on the land which overhangs Strong Tide Corner. The Portuguese factories are in the interior, near a village in which the king lives. At the North side of the town, and close to the mouth of the Logé River, is an iron pier, 200 ft. long, of great use in loading and unloading the lighters; it is marked by a pillar with a lantern on the top, which is said to be lighted at night.

A *Semaphore* station has been established at Ambriz, with which vessels can communicate by the International Code of Signals.

In 1855 the Portuguese Government established a military post here, to check the slave dealings of the chief of Ambriz, and also to protect the legitimate commerce, chiefly in copper ore from the Mountains of Bembe, some distance inland, the produce of which was readily transported to the sea by means of the Rivers Doce and Ambriz.

The presidio of Bembe, called after the king, *Pedro Quinto*, protects these copper mines (of malachite). An English engineer and assistants were sent out in 1855, but they fell a prey to the climate. In 1857 they were superintended by a Portuguese, and were tolerably productive, but since then they have fallen off, and are now closed.

The Bay of Ambriz was very much frequented by slavers, and the slave factories hereabouts were the most important on the coast; although they were burnt once by the English cruisers, they were rebuilt on the same spots. The trading huts were situated in the interior, and concealed in the woods; from these the slaves were transferred to others along the coast. In Ambriz Bay the trade was carried on on a large scale, and immense capital was embarked in it. Each factory communicated with its subordinates by means of signals, which were exchanged as rapidly as by the telegraph. In this way they made it known along a great extent of coast, whether or not there were any cruisers near, the course the cruisers were taking, what direction they came from, and which way they were going; so that the repression of the trade was rendered immensely difficult.

Quitunga, or *Little Masula Road*, is S. ¼ E. 10 miles distant from Ambriz. The *Little River Masula* (or *Mossul*) enters the head of the bay, which is not a mile wide between its two rocky points. The village of Little Masula lies on a patch of land which surmounts the cliffs of the coast. You can anchor before it in 7 or 8 fathoms.

Mount Bamba, which appears quite separated from the other hills, when bearing East, is a hill of rounded form at the top, and with sloping sides, 3 miles N.N.E. of Little Masula. The land on the coast is parched, and bears only a few clumps of trees.

MAZULA BAY, or *Great Masula Bay*, is 14 miles South of the former, and into it falls the *River Onzo* (or *Lifune*). On the left bank of the River Onzo stands the village of Mossul, visible from the sea, and having some American factories.* Between the Bays of Little and Great Mazula the coast is everywhere formed of white perpendicular cliffs, of uniform height, only cleft at the top in some places, with a rocky reef stretching a mile off shore, between the bays. The coast between the two bays presents a very remarkable appearance; it is, as we have just said, a line of precipitous cliffs, stretching South to the entrance of the River Onzo, the mouth of which is indicated by a deep fissure, the cliffs shelving down on each side, and by a mass of dark verdure which fills the fissure. Above the cliffs, the whole length of the coast between the two bays, there is a line of hills, some rounded and some pointed at the top. They form two chains: the first, parallel to the shore and close to it, is called for distinction the *Seven Hills;* the second, 10 or 11 miles back in the interior, is more peaked, and has the name of the *Masula Hills.* These hills form an excellent landmark.

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* Mussul, or Masula, or Mazula, gives a title to a Portuguese marquis. The Marques do Mossul is lord over the country between the Rio Loge (or Doce), to the North, and the Rio Lifune to the South. J. J. de Lima, and Livro III., part ii., p. 22.

The *River Lusina* is 8 miles S.S.E. of Masula, the cliffs between these two rivers being still perpendicular. The land at the top is wooded.* The mouth of the Lusina is distinguishable by masses of tall and beautiful trees, which line the shore for a short distance, the hue of which contrasts strongly with the red colour of the land, and of the hills in the background.

DANDE′.—The North point of the mouth of the River Lusina is the North point of the *Bay of Dandé*; its South point, called *Cape Dandé,* lies 8 miles S.W. by S. of the former, the shore between being sandy. The bay forms two unequal indentations, quite distinct, and separated from each other by a high rocky point, 4 miles from Cape Dandé. When seen from the W.S.W., this intermediate point appears perpendicular. Above the sandy beach is a line of hillocks, and trees fill the hollows of the land. The Masula Hills are seen quite behind, 11 miles in the interior.

Cape Dande′, the South point of the bay, is formed of a perpendicular cliff, lofty, flat, and barren at its summit. It descends perpendicularly to its base, which slopes down in an inclined plane. This headland is very prominent and bold, especially when seen from the W.S.W. From Cape Dandé the cliffs continue eastward for 2 miles, in the inner part of the bay, and then from the left bank of the river of the same name, which is indicated at its entrance by trees and mangroves. The river is quite at the South of the Bay of Dandé, and the precipitous cliff which marks its left bank is spotted white and red.

The *River Dandé* is said to be navigable by good sized vessels, even for some distance above the town of the same name, which is situated 4 miles up on the left bank. This town, the first Portuguese establishment in the North, is an old station, which formerly had a great trade with the Brasils and the Portuguese Islands. It still has an active trade.

You can anchor in Dandé Bay, N.N.W. of the mouth of the river, in 10 fathoms, and along the shore at the bottom of the bay, in 9 fathoms, 2½ miles from the land. The bay is perfectly safe in these soundings, and no danger is known near the shore. N.W. of Cape Dandé there is 12 fathoms, 1½ mile distant. In 1849, H.M.S. *Cyclops* grounded on a sandy shoal, 1¾ mile off shore, with Cape Dandé bearing about S.W. by W., and the point of Dandé River S. by E. The River Dandé is the South boundary of the Province of Masula.

Cape Spilimberta is a rounded promontory, 8 miles S. ¾ W. from Cape Dandé, the coast between them consisting of high red and white cliffs. From hence the coast trends S. by E. ½ E. 6 miles, still formed of cliffs, to the commencement of the sandy beach of the Bay of Bengo.

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* In the charts of Capt. de Lima there is a mine of petroleum marked in the space between the Lifune and the Dandé Rivers. The region about here appears to be carboniferous, for in addition to that alluded to, there are some "oil springs" up the River Dandé, in the mountains of Libongo. This asphalte or petroleum was known to the early Portuguese, who used it for caulking and careening ships. It might be made available for fuel for steamers, being found at the entrance of the river, and at only about 24 miles from St. Paulo.

BENGO BAY, or Bango Bay, is the largest indentation of the coast between Great Fish Bay and Cape Lopes. It is bounded by Cape Spilimberta and Cape Lagostas, N.E. ½ N. and S.W. ½ S., 10 miles apart. In the North part of the bay the land is low and without verdure, presenting the same appearance so frequent to the South of this.

The *River Bengo* debouches at the head of the bay, at 7 miles S.E. by E. of Cape Lagostas. It is indicated by some trees on the beach, and to the East of it rises a high hill. To the West of it, 3 miles off, is a large building, surrounded by houses, called *Bengo*; it is an establishment inhabited by Portuguese, from which the markets of St. Paul de Loanda derives its chief provisions.

The bay is much frequented by shipping, who anchor here to learn the state of affairs at the capital before proceeding there, and thus avoid the anchorage dues of that port, which are very high. The soundings in the bay diminish gradually toward the shore, being deepest on the South side. In approaching it from the North, keep the lighthouse on Cape Lagostas about half a point to the East of South, to avoid the great bank extending to the E.N.E. of Loanda Island, on the extremity of which is a small lighthouse, the best mark for avoiding it. In coming from the West, you must keep 3½ miles off Cape Lagostas, and bear to the North until Fort San Pedro, to the South of the cape, is in one with the *Quinta*, a country house, very conspicuous on the top of the cliff, bearing S. ½ W., when you will have doubled the extremity of the reef off Loanda Island, and you may then proceed for the anchorage in the bay. The same directions also answer in coming from the South. You can anchor with Cape Lagostas bearing S.W., 4 miles distant, and Bengo Fort, the large building at the bottom of the bay South, in 14 fathoms; or you may do so within a mile of the cape in 16 fathoms; or farther in the bay to the North of Bengo Fort, in 7 or 7½ fathoms. This anchorage is useful to a ship which is proceeding to St. Paul when overtaken by night, or during a calm. The bay is clean throughout.

Cape Lagostas (Lobsters Cape), the S.W. point of Bengo Bay, is easily known, being a perpendicular cliff of a banded red, white, and greenish colour, and crowned with bushes. A mass of black and sharp rocks lie around its base. It is, however, quite safe, and therefore is the best side on which to approach St. Paul de Loanda.

Lighthouse.— On Cape Lagostas is a lighthouse, 32 ft. high, showing a *fixed bright* light, varied by a *flash* every 2 minutes, elevated 210 ft., and visible 24 miles in clear weather.

PORTO DE LOANDA.—At 1½ mile southward of Cape Lagostas is the Fort of San Pedro (or Fortaleza de San Pedro do Morro da Cassandama), cut in the cliff itself, and some yards above the sea. Its walls are of a reddish colour, and it presents a formidable double tier of artillery.

The port is formed by the low, narrow, and sandy island of *Loando*, 6½ miles in length, E.N.E. and W.S.W., which forms a bay with the coast on which the city is situated, The distance between is about 1½ mile, and the water shoal, some parts being dry at low water, with spring tides. On the island are several villages. From its North end a hard sandy reef, nearly half a mile broad, extends 2 miles E.N.E., and upon a great part of which there is only 12 ft. of water; there is a lighthouse on its N.E. extremity. Cape Lagostas S.E. by S. leads just clear of its North end, in from 17 to 20 fathoms; and Bengo Point (low, but seen well out from afar), a little open to the left of the cape, bearing S.E. by S. ½ S., leads nearly a mile to the N.E. of the reef and to the entrance of the harbour, which lies between this reef and Cape Lagostas, 1¼ mile apart. The lighthouse will form the best mark for avoiding this reef. The situation of a pole on the North end of Loando Isle, as determined by the officers of H.M.S. *Leven*, in 1825, is lat. 8° 46′ 12″, long. 13° 14′ 18″. It is high water in the port, on full and change, at $4^h\ 30^m$; springs rise 5 ft.

From Cape Lagostas the coast rounds 1½ mile to the S.W., where stands *Fort San Pedro*, before mentioned, and a cenotaph. From this the coast concaves to the S.W. 4½ miles, to *Fort San Miguel*, which stands on the West of the town, and may be considered as the citadel. The depths in the harbour, to the distance of 1⅓ mile from Fort San Miguel, are 17, 16, 14, to 11 fathoms, whence they suddenly shoalen to 12 and 6 ft. water.

A *Semaphore* station has been established on Fort San Miguel, with which vessels can communicate by the International Code of Signals.

From Dandé to St. Paul de Loanda, or its island, you may run with a S. by W. wind; but if it blows hard, it will be found difficult; therefore you must go into Bengo Bay, which you safely enter as far as 10 fathoms, and ride there till next day; then you are sure of a land wind that will carry you into the port.

Loanda Island, or rather peninsula, forms the port or anchorage of St. Paul. It is merely a sandy spit or bank, extending E.N.E. and W.S.W., and reaches about 2⅛ miles from abreast of Fort San Miguel, from which it is only 2½ cables distant. It is very narrow and flat, but has above 1,200 inhabitants, chiefly blacks, engaged in fishing. There are some houses belonging to the more wealthy people of Loanda, with a number of gardens, and groves of palm trees. The arsenal is on the island, and some naval stores are kept here, including a *coaling depot*. From the island being under the influence of the sea breeze, it is very pleasant, and pic-nic parties visit it from the city. This island was the earliest of the Portuguese conquests on this part of the coast. Paulo Dias de Novaes landed here in 1575, and found it occupied by a peaceful population, chiefly engaged in collecting cowries, which were very plentiful here.

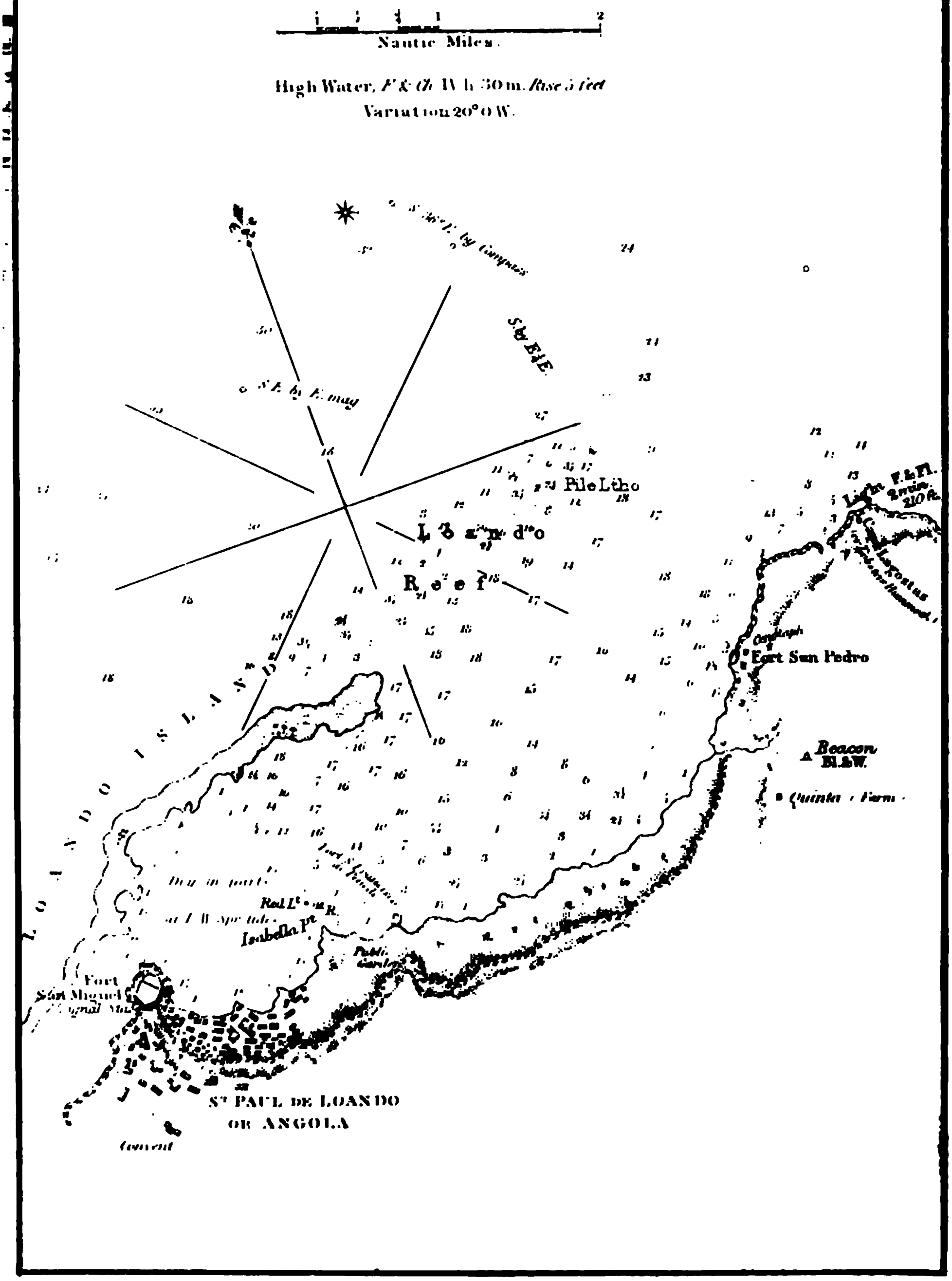
From its N.E. extreme a dangerous shoal extends for 2 miles E.N.E., which requires the utmost caution, it being necessary to keep the shore of the mainland, the Morro das Lagostas, close aboard.

Light.—A small lighthouse is erected on the N.E. extreme of Loanda Reef, and shows a *fixed bright* light, visible 10 miles. This light is to supersede the *lightvessel* which was moored 3½ cables N.E. of the extremity of the reef.

Although the head of the harbour is filling up, the sea is encroaching on the North end of the island, and it is said that the shoal is only the remains of the island, and that at the end of the seventeenth century a fort stood at the N.E. point, of which there is now only an accumulation of stones.

Loanda Island is so low, that it cannot be seen when you are in 12 fathoms; though beyond it you perceive the mainland, which is higher. Being come so

St. PAUL DE LOANDO.



near as to see the island, you will, from the maintopmast, descry the whole of it, and the sea on the East side.

Beacon Lights.—Two small *fixed red* lights are shown from beacons to mark the channel for small vessels to the landing place in the harbour. The outer beacon, of stone, with the light elevated 20 ft., is at the North end of a small ledge of rocks, N. ½ W. of Isabella Point (4½ cables westward of the coal depôt), and a red buoy is moored in 6 ft. at the S.E. extreme of the ledge. The inner beacon marks a sunken vessel, and the channel lies eastward of the buoy and beacons.

In entering the harbour of St. Paul de Loanda, the lighthouse on Cape Lagostas and that on Loanda Reef will be found of great service. When advancing from the northward, you may approach Cape Lagostas within half a mile, on a South bearing; then steer toward mid-channel to the W.S.W., and toward Fort San Miguel, which stands on an eminence West of the town. The fort should be kept a sail's breadth open to the southward of the N.E. end of Loando Island, passing over from 19 to 12 fathoms, until you get abreast of Fort San Francisco, standing on the East of the town, where you may anchor with good holding ground, in 10 or 12 fathoms. Vessels should not venture to pass beyond this fort, as the water shoalens very quickly above it.

In coming from the southward, keep well out to the northward of Loando, or until you open, on nearly a S.S.E. bearing, the bluff point in Bengo Bay, within Cape Lagostas, which you may then steer for, rounding the lighthouse on the reef, and proceeding as before directed, nearly up to Fort San Francisco.

A *beacon*, a triangular masonry pyramid, 19 ft. high, and painted in black and white stripes, is erected about 600 yards N.E. by E. of the Quinta, and when kept in line with the centre of Fort San Pedro bearing S. by E. ½ E., leads about 1 cable clear of the N.E. edge of Loanda Reef. Vessels entering the harbour with these leading marks in line, may haul up for the anchorage when Fort San Miguel is seen well open of the N.E. point of Loanda Island.

As the sea breeze blows right out of the harbour, a vessel has generally to work up to the anchorage, unless she has anchored overnight in Bengo Bay, whence she would have the land wind in the early morning, fair into port. But if compelled to work in, after having tacked off Cape Lagostas and standing over towards Loanda Reef, tack before Fort San Miguel comes on with the S.E. end of Loanda Island, as the reef is steep-to, with 17 and 18 fathoms close alongside it. Then standing towards the mainland, tack before the cathedral on the hill within Fort San Miguel touches the sandy point of the public gardens, as the bank is steep-to, and the water will shoal while in stays from 12 to 5 fathoms; on the other side the island shore is bold-to, and may be approached accordingly.

Curimba.—An inlet of the coast, at the South end of Loando Island, is called Curimba Cove, and is defended by a fort, San Fernao; but, according to Capt. de Ville-sur-Arce, this passage is only fit for canoes. From this place the coast forms a lagoon, extending 15 miles to the S.W., and which is divided from the sea by a narrow strip of low, sandy land. From the bar of Curimba Cove the coast trends S.W. by W. 10½ miles, and S.S.W. 7 miles, to a sandy point, called *Palmarinha Point*, on account of its palm trees, green and withered; and from which a sandy reef stretches off nearly 2 miles.

SAO PAULO DE LOANDA, or, to give it due honour, the *Cidade de Sao Paulo da Assumpçao de Loanda*, is the capital of the Portuguese possessions of Angola (by which name it is sometimes known) and Benguela. It stands at the head of the bay or port to which it gives its name, deriving it from the Island of Loanda, which shelters it to the West. It is divided into the upper and lower towns, the lower extending East and West along the beach, from the *Ponta da Isabel* westward, or, more properly, from the convent of *Nazareth* to the foot of the Morro of Sao Miguel, on which stands the fortress of the same name, the citadel of Loanda. Adjoining the Nazareth convent are the country houses of the richer citizens. To the suburb succeeds the *Praia do Bungo*, which forms a point seaward, readily distinguished by the cocoa-nut trees which shade it. Beyond this is a large collection of small houses, called *Quitanda Pequena* (little market). Passing the Praia do Bungo, we see the handsome custom-house, the quays, and the sheds which protect the boats, &c., of the arsenal. Behind these are the extensive cavalry barracks, fitted for 200 horses. To the left of this is the chapel of *Sta. Iphigenia*, the church of *N. S. de Remedios*, and to the extreme West the church of Corpo Santo. Near this is the *Quitanda Grande*, the chief market. From near to this the *Calçada Nova* leads to the upper city, and is lined with good houses. In the upper city, or cidade alta, the most healthy part, are the palace of the governor, the residences of the bishop and the principal functionaries, the churches of S. Joao (for the military), and of la Misericordia, annexed to the hospital, the cathedral, now partly in ruins. To the North of the governor's palace is the church of do Rosario, and beyond this that of S. Jose, which formed part of a convent coeval with the first conquest. Beyond this are the barriers of the city, outside of which are the *Maiangas*, or public tanks, which serve as a place of recreation for the inhabitants, and which also communicate with the *Passeio Publico*, formed on the point at the entrance of the port by the Praia do Bungo.

According to the estimate given by Capt. de Lima of the population, &c., there were, in the city, 1,176 hearths or fire-places; 1,601 whites (1,466 males, 135 females); 491 coloured people (230 males, 261 females); blacks, 3,513 (free males, 335, free females, 445); slaves, males, 1,073; slaves, females, 1,660; or, altogether, a population of 5,065 souls. In 1870 the census gave the population of Loanda as 16,252.

Loanda was reached by Dr. Livingstone in June, 1854, in his remarkable journey across the continent with his Makololo followers, and from this he crossed over with them to Quilimane, at the mouth of the River Zambesi, on the shores of the Indian Ocean. He says: St. Paul de Loanda has been a very considerable city, but is now in a state of decay. There are various evidences of its former magnificence, especially two cathedrals, one of which, once a Jesuit college, is now converted into a workshop; and in passing the other we saw, with sorrow, a number of oxen feeding within its stately walls. Three forts continued in a good state of repair. Many large stone houses are to be found. The palace of the governor and government officers are commodious structures, but nearly all the houses are composed of wattle and daub. Trees are planted all over the town, for the sake of shade; and the city presents an imposing appearance from the sea. It is provided with an effective police; and the custom-house department is exceedingly well managed. All parties agree in representing the Portuguese authorities as both polite and obliging;

and if ever any inconvenience is felt by strangers visiting the port, it must be considered the fault of the system, not of the men.

The harbour is formed of the low sandy island of Loanda, which is inhabited by about 1,300 souls, upwards of 600 of whom are industrious native fishermen, who supply the city with abundance of good fish daily. When a high S.W. wind blows, the waves of the ocean dash over part of the island, and, driving large quantities of sand before them, gradually fill up the harbour. Great quantities of soil are also washed in the rainy season from the heights above the city, so that the port, which once contained water sufficient to float the largest ships close to the custom-house, is now dry at low water. There is a wharf at the custom-house, with a steam crane. Nearly all the water consumed in Loanda is brought from the River Bengo in launches, the only supply that the city affords being some deep wells of slightly brackish water.*

The Portuguese government propose to construct a railway from Loanda to *Ambacca*, the centre of the coffee district, and also to supply the city with a water service from the River Bengo. The city is also improving in appearance under the influence of a more extended system of trading.

Time Ball.—A time ball is hoisted half-mast on the staff of the Observatory tower at $0^h\ 50^m$ p.m.; close up at $0^h\ 55^m$; and dropped at $1^h\ 0^m$ p.m., mean time at St. Paul de Loanda, but it is reported to be occasionally inaccurate.

The city is strongly fortified, and these safeguards are still in good preservation, but the city looks like a bombarded place, the ruined houses and churches falling to pieces in all directions. M. Valdez, who came here in 1855, thus describes the forts that are passed in entering:—

The first is the four-gun fort of Nossa Senhora de Conceiçao, next the fortress of St. Pedro do Morro da Cassandama, erected on a hill about half a mile to the South of Morro das Lagostas, at the entrance of the bay, and lying, East and West, opposite to the cape of the Island of Loanda. The fortress of St. Pedro was commenced in 1703, and finished in 1705. It contains suitable accommodation for the governor, besides officers' quarters, barracks, magazine, and a tank.

Next is the beautiful fortress of St. Francisco do Penedo, which takes its name from a rock near the beach, on which, in 1687, was originally constructed a small fort of four guns. But in 1765, Dom Francisco Innocencio de Souza Cotinho undertook to unite this rock with the main land, and in seventeen months he succeeded in raising above the waves the handsomest fortress of Angola, built on the Vauban system, of an irregular pentagon, surrounded by two batteries. The higher and superior one has twenty-four guns, and the lower one has, between wind and water, thirty-seven guns. This fortress has complete command of the entrance to the port, and of the anchorage; it also commands the road leading from the Cacnaco to the church of Nazareth, by which road, provisions, &c., are conveyed from the country to Loanda. This fortress is the depôt for all the gunpowder brought to Loanda, the merchants paying for storage at the rate of 1s. 5¾d. per barrel. Inside the fortress i the residence of the governor, who has also another splendid mansion, surrounded by gardens, outside the bridge leading to the beach, and opposite th fortress.

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* Missionary Travels, &c., in South Africa, by David Livingstone, L.L.D., D.C.L., 1857, page 394.

The last is the fort of St. Miguel, which is erected on a green luxuriant hil and commands the town, the sea, and the island; it is also built on the Vauba system. This fortress consists of an irregular polygon, following the shape c the hill of St. Miguel, formerly called St. Paulo, from which originated th name of the town of St. Paulo de Loanda. On the inland side are two goo bastions, with ten guns each, which cross fire with the battery Do Cavalheirc which has sixteen guns.

This fortress is celebrated as being the place where, on the 15th of August 1648, seven years after they had taken the city, the Dutch capitulated; and surrendering the fortress into the hands of the Portuguese, vacated Loanda.

In consequence of the town being taken on the 15th of August (Lady-day) it received the name of "St. Paul of the Assumption of Loanda," and, i commemoration of this event, the municipality annually celebrate the 15th o August.

Capt. Owen was received at the port with great civility by the governor anc officers, but the inhabitants would render no assistance, and water was not obtained without difficulty.

In the Narrative of the Expedition, this place is described as follows:—

"The city was erected by the Portuguese in 1578; it is large, being s bishop's see, and contains several churches, with many private and public buildings, but many are in ruins or a state of decay. The lower town skirts the shore of the harbour, and consists principally of mean hovels, the residences of the free black portion of the population. The principal commerce consists in ivory, palm oil and kernels, gum-copal, orchilla, cotton, india-rubber, and bees'-wax; the last is procured in great quantities from the interior at a low rate, and sold in Portugal and other Catholic countries at an exorbitant profit.

"The market is tolerably well supplied, especially with fruit and vegetables. Bullocks and goats are plentiful but dear, the former costing about 2 dollars each. The River Bengo supplies the town with excellent water, which is daily conveyed to the city in tank boats, at the rate of 2 dollars per ton."—*Capt. Owen.*

Water is delivered alongside at about 6*s*. per ton, but is thick and muddy Fish is plentiful, and other supplies can be obtained at moderate prices. Mai steamers from Lisbon and England call here about once a month.

Vegetables are plentiful, but large and tasteless; the tomatoes are excellent As a rule oranges are the only fruit. There is only one *good* well in the town and that is monopolised by the government and officers.—*R. F. B.*

When the Dutch had possession of the country they endeavoured to construc a conduit from the River Coanza at its confluence with the Lucala, so as tc convey its water to Loanda; but it was given up on account of the cost.

In former days labour was much more easily procurable than now. Since the abolition of the Carregadores, or compulsory labour at stated fees, there has been much difficulty, and it is considered that although morally right yet that it has done much harm. Sailors should not be allowed much, c any, liberty on shore, as drunkenness is very prevalent, and cases of stabbing abundant.

The Climate of Loanda is in marked contrast to that of Quiloa, Zanzibar, &c., on the Eastern Coast of Africa, in the same parallel of latitude. The trade winds and monsoons of the Indian Ocean bring on to the latter shores a vast amount of rain and cloud, which make the climate generally very damp and unhealthy. On the western coast, on the other hand, the trade winds having to cross the whole breadth of the continent, deposit their superabundant vapours, and reach the Atlantic coast as comparatively dry winds. Consequently the regions of Angola, Loanda, &c., are much more healthy.

The sun in October, passing through the parallels to the Tropic of Capricorn, occasions most intense heat, attended with light rains, seldom lasting more than ten or twelve days; and the medium temperature in this month is from 120° to 130° of Fahrenheit. The heat then declines to about 104°, which is considered as the medium temperature during the months of December and January, after which it gradually increases with the return of the sun to the North, until November, when the atmosphere becomes heavy and warm, with hot gales from the East. Then it is that Europeans are most affected; during the months of March and April, which was the season in which I first visited Calumbo, the great rains fall, after this ague, dysentery, and inflammatory diseases—especially what is called *carneirada*, which is so fatal to Europeans—become prevalent.

The winter season is from June to September, and is considered the most healthy; it is termed the Caçimbo, which signifies cool weather. During this the atmosphere is quite clear from about 10 o'clock in the morning until sunset, with cool refreshing breezes, the heat seldom exceeding 88° Fahrenheit. The people have a traditional conviction that the Caçimbo commences as early as the 15th of May.

This is also the usual harvest season, when the rains have fallen at the ordinary time. The rains, however, are in general not so heavy here as nearer the Equator; neither are the winds so high, nor the thunder so frequent and so loud.

The whole of the Island of Loanda, and of the bank which stretches off from Point Palmarinhas, is safe, and has a considerable depth of water close-to. To the N.E. of Point Palmarinhas is the Portuguese establishment of *Tanza*.

Coanza, or Sleeper's Bay, is a slight indentation of the coast, the South point of which scarcely projects from it, lying S.E. by S. ¼ S., 6 miles from Point Palmarinhas. At the bottom of the bay is a small sandy beach, and the bay may be known by a high, dark-coloured wood in its centre, near the beach, and in its northern part are two hills, called the *Paps*. You can anchor in it in 6, 7, 8, and 9 fathoms, oazy bottom. The South point of Coanza Bay is the North limit of another bay, called *Nicephas Bay*, which will afford anchorage in from 8 to 9 fathoms. Its South point is called *Molli Point*, in lat. 9° 20′ S., long. 13° 12′ E. It is densely wooded, and owes its name to a small Dutch fort which formerly existed on it.

COANZA, or QUANZA, RIVER is a very considerable stream, but only

navigable by small vessels owing to its shallowness during part of the yea
Its upper branches were traversed by Dr. Livingstone, in his journey in 18
and 1854. Point Molli is its North point, the entrance being about 2 mil
wide, the current issuing from it being exceedingly rapid. At the distanc
of 10 or 12 miles off, the sea is discoloured by its muddy waters. The mout
of the river may be known by the Paps (or *Mamas*) before mentioned, an
also by an island on the middle of the bar, densely covered with trees. Th
banks, &c., which form the bar, are shifting, and consequently no permaner
directions can be given. To the same cause is owing the existence of sever
islands in the mouth of the river, which show signs of having been onc
inhabited, but now only frequented at times by fishermen. The bar of th
river frequently breaks throughout its whole extent, and to enter the river it
doubtless necessary to await a favourable time. A boat should not attempt i
Small vessels drawing at most 8½ ft. can enter it, and penetrate a considerabl
distance up the river. Its direction appears to be about E.S.E. Vessels ca
anchor off the mouth of the river.

Along the course of the river the Portuguese have several establishment
and districts, of which the district of the Duque de Bragança, in the Ging
country, 360 miles from its mouth, appears to be the most remote. Many
these presidios are very old, dating from periods soon after the first conques
but of the present nature of which we have not many particulars, those mo
recent and authentic being given in the works of Capt. de Lima, in 1846,
and the works of M. Fran. Trevassos Valdez, African Occidental, Noticia
etc., Lisbon, 1864; and Six Years of a Traveller's Life in Western Afric
London, 1861.

It was also surveyed by Carl Alexanderson, Esq., F.R.G.S., in 1873-4, an

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[*] At about 6 miles from the entrance is the island of *Quinzanga*, which has a few hous
on it; and abreast of it, on the North bank, is the Portuguese village of *Calumba*, one
the earliest establishments. A RAILWAY has been proposed to Calumba from Loanda!
90 miles above the entrance is the *Presidio of Muxima*, founded in 1599, which rules ov
a population of 9,168, including 13 Europeans. At 35 miles above this, on the opposite
North bank, is the *Presidio of Massangano*, founded in 1580-3, standing on a tongue of la
at the confluence of the Cuanza and *Lucala* Rivers. The fort is regularly constructed. Th
population of this presidio is 13,114, including 22 Europeans or whites. The *Presidio*
Cambambe is 40 miles above this last, and has a population of 21,546, including 10 whi
people. It was founded in 1604. This is the limit of the navigation of the river from i
mouth; for 30 miles above Cambambe there are some cataracts and rapids, (now known
the *Livingstone Falls*). Between Cambambe and Massangano, on the North bank
Cuanza, the famous fair of *Dongo* is held. The next presidio is that of *Pedras de Pungo*
Dongo, containing a population of 10,291, with 33 whites or Europeans. It was th
ancient capital of the kings of Dongo, and taken by Portugal in 1671. The fort is 5 mil
from the North bank of the river, and 60 miles E.N.E. of Cambambe. It stands in
superb situation, in the midst of a country of wonderful beauty and fertility. It occupi
the luxuriant summit of a sandstone rock, inaccessible, except by a cavern through it
the fort. The fantastic forms of this rock remind the traveller of the ruins of an Egypti
temple. The last presidio on the river, 360 miles from its mouth, was founded in 183
and named *Duque de Braganza*. It is the conquered districts of *Quiloange Quiassama*, take
from the King of Ginga, and is stated to be healthy and fertile. Of its population ver
little is known, but is supposed to be about 20,000.

We have extracted these particulars from the "Ensaio Statistico," of Capt. J. J. de Lim
livro iii., parte i., p. 4; and parte ii., cap. i., pp. 11 et seq.

an account of the river, with a map, will be found in the Journal of the Royal Geographical Society, vol. xlvi., 1876, p. 428. Mr. Alexanderson says the bar should not be crossed by a stranger till a boat has sounded the channel. Trade is very brisk in the river; but the climate is unhealthy. The factories are nearly all on the right bank.

There are four steamers on the river, trading between St. Paul de Loanda and *Dondo*, the latter being the principal and the highest inland port approachable by water. At *Cunga* there is a cotton factory, and a sugar plantation at *Bom Jesus*.

The Coanza is the southern limit of the kingdom of Angola.

V.—THE GOVERNMENT OF BENGUELA.

Benguella, or Benguela, a province of the Portuguese dominions extending from the Cuanza River, or by some, from the Rio Longo, to Cape Negro in the deserts of Cimbebasia, has a coast of 440 miles in length. In most European works it has been termed Benguela; by the Portuguese authorities it is spelt Benguella.

The Portuguese obtained their first possession here on the site of the present capital, in 1617, when the Governor of Angola, Manoel de Cerveira Pereira, established a fort, and subsequently obtained for himself the title of Conqueror of Benguella.* At the present time the country is divided into three presidios and four districts, which contain an estimated population of 140,514, divided as follows:—whites or Europeans, 92; coloured or mulattoes (slaves and free), 3,232; negroes (slaves and free), 137,190.

It must not be supposed that the Portuguese Government have authority over all the people enumerated above; as in other cases the sovereignty is merely nominal. In former times, when the slave trade was actively and profitably pursued, this possession was rich and flourishing. Since the activity employed in its suppression, it has sunk into great wretchedness and depression; the trade in negroes is still pursued in an illicit manner, commerce having no existence, with the exception of a few exports of ivory, wax, gum-copal, and some skins. Cultivation is strictly limited to the necessities of the population.

CAPE LEDO, or *Merry Cape*, in lat. 9° 46′ S., long. 13° 17′ E., is about 29 miles S. by W. from the mouth of the River Coanza. This cape is a high, rugged promontory, with straggling trees, projecting into the sea; for about 12 miles northward of it, as far as *Black Rocky Point*, the coast is all steep hills and verdant land. There is a sandy cove called *Massoté*, close to that point, which affords but little shelter, and at the head of which is the mouth of a small river, called *Suto*. Near this is the best landing-place, at a small factory.

Cape San Bras.—At 15 miles S. ½ W. from Cape Ledo is *Cape St. Bras* (St. Blaize), which appears like Portland in the English Channel. The shore between forms a slender bay, which is bordered by remarkable white cliffs; the soundings are regular, with 10 fathoms, 2 or 3 miles off shore. On the North side of Cape St. Bras is a sandy cove, where you may anchor in from 8 to 4 fathoms. To the North of a white cliff, and 5 miles northward of the cape, is the mouth of the small river Quesimi (qy. Quissama).

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* The relation of this conquest will be found in Captain J. J. de Lima's work, livro iii., parte ii., p. 27.

"I anchored with Cape San Bras bearing S.E. three-quarters of a mile, and found a very long rolling swell. I took the master sounding with me, and found 6½ and 7 fathoms water within a quarter of a mile of the cape, and 4½ fathoms within half a cable's length of it, with the same depth all round the bay near the beach. A spit of sand runs out at the head of the bay, about a quarter of a mile in length, with deep water close to it on either side; inside the spit there is a beautiful snug little harbour, about a quarter of a mile long, and 3 cables' lengths broad, with 2½ and 3 fathoms water nearly the whole way up. The harbour is full of fish; the only afternoon I was there I hauled the seine, and caught a great quantity of Cape salmon, flat fish, sardines, soles, nine sharks, and ten sword fish. I did not see any Portuguese settlers there, but a few blacks from the country, who seemed inclined to be very friendly and anxious to trade."—*Commander P. H. Dyke, R.N.*

Cape Longo.—From Cape St. Bras the coast trends 18 miles S. ¼ E. to a bluff headlead, named *Ponta da Longa;* at 6 miles S.E. of which is the mouth of *Rio Longo*, in lat. 10° 19′ 10″ S., long. 13° 33′ E. This was a general rendezvous for slave vessels from Benguela and St. Paul de Loanda, from which place the slaves were marched overland. There are no inhabitants; but lions, tigers, deer, and other animals exist in great numbers. This is considered to be the southern limit of the Government of Angola.

Cape Benguela Velha (*Old Benguela*), or *Morro Point*, 32 miles S. ½ E. from Ponta Longa, is a high, steep, perpendicular point, projecting considerably from the coast, and covered with tall straight cactus trees. On its summit is a large village, and some factories are established in the bay formed to the North of it, but it is now an insignificant place. There is sheltered anchorage to the N.E. of Morro Point. Within Cape Longo the cliffy coast trends S.E. for 6 miles, which on the old charts is called Bahia, or Praia Longa, which is limited by *Ponta Morena*, or *Cape Three Points*, the South point of the mouth of the Rio Longo. The coast is all safe. The latter cape lies 9 miles S. ½ E. from Cape Longo.

Rio Cubo.*—At 9 miles S.S.E. of Cape Old Benguela is the North point of the entrance of the Rio Cubo, with an uninhabited island, nearly 3 miles in length, in the mouth of it. According to M. Kerhallet, this embouchure is common to the Cubo and the *Rio Moroa;* but in the work of Captain de Lima no mention is made of such a river. The Rio Cubo is a very large river, and said to be 300 miles long, running first N.W., and for the last 100 miles to W.S.W. About 5 miles southward is the *Moroa River*, and at 12 miles from the Rio Cubo is the village of *Kingo* or *Quingo*, where seven large factories are established. Landing is very difficult here, but this does not prevent vessels from embarking their cargoes; but getting wet in these countries brings fever.

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* Called variously *Rio Curo, Cuba, Coubo, Cuevo.* The entrance of the river was formerly called the *Porto de Sumbe Ambela.*

NOVO REDONDO (*Nova Redonda*).—This fort, whch was founded in 1769, and rebuilt of stone in 1785, is in lat. 11° 12′ S., long. 13° 51′ 30″ E., 25½ miles S. ¼ E. from Morro Point. The town is considered to be the third, in point of size and consequence, in the Portuguese possessions, but the fort appears to be in a very dilapidated state. Stock of all kinds may be procured here, but no water. You can seldom land, excepting in the surf boats, a number of which are always in readiness on the beach. The best anchorage is with the fort bearing E.S.E., in from 4 to 7 fathoms. The town may be known by the large white houses on the hill, or at a greater distance by the very high mountains behind it.

Rio de Novo Redondo, called by Captain de Lima *Rio Gunza* (or *Gunza Cabolo*), rises about 60 miles in the interior, and flows through a rich and thickly populated country. Before the fort is a bank, which is said to extend 3 miles to the West, and therefore vessels should keep off beyond that distance. Captain R. de Rosencoat says that a brig struck on it, and was obliged to throw her guns overboard, to get off.

QUICOMBO.—From Novo Redondo the coast runs nearly in a straight line, 8 miles S.W. by S., to *Quicombo*, or Manikicongo. The South point of this bay is in lat. 11° 20′ S., long. 13° 48′ E., off which there is a rocky shoal, on which the sea sometimes breaks, and which extends about a mile to seaward, or N.W. There is good anchorage in the bay, except during the time of the rollers or calêma, and then it is requisite to anchor outside the point. To enter the bay, you should keep the village bearing South or S. by W., when you may anchor at any convenient distance. The inner anchorage is with the village bearing S. by W.; the South point, S.W. by W.; and the North bluff point, N.E. by N.; or with the fort at Novo Redondo just shut in by the latter. On leaving the bay you should not come any higher than N.W., until you are well clear of the shoal off the South point.

Here are several Portuguese factories for orchilla, gum, &c. Bullocks are very plentiful and very cheap, and water, though indifferent, is easily obtained. The bay may be known at a distance by a white road leading from the village over the mountains. This bay is the more important to be known, as it is the only one from hence to Little Fish Bay, where water can be easily procured. It is easily made out in coming from the South by *Red Point*, which is 3 miles South of Quicombo, and by the mark given above. A vein of nitre has been discovered near the bay.

" Quicombo is a capital place for watering. Close over the beach near the village is a large sheet of water with a running stream, which comes from the mountains, where you fill your casks, and parbuckle them into the boat. I have been given to understand that, for about a couple of days after the full and change of the moon, the rollers set in so very heavy that it is impossible to communicate with the shore, much less to procure water; therefore you ought to be careful, and not anchor nearer to the beach than 1½ mile, should you be going to stay over that time. I saw the French brig-of-war *Messager* go into what is called the inner anchorage, but was obliged to shift her berth out again immediately, in consequence of her rolling so heavily. There is a reef that extends about 1 mile (and which constantly breaks), running out from the southern point of the bay, which is very bluff, and quite red, it being the only place near here where the land is red, so it cannot be mistaken.

Close at the back of the village there is a large zigzag road, communicating with the interior, which is the most conspicuous mark of all.

"The bearings I took when anchored were:—Road on the back of the town, S.S.E. ¼ E.; southern point, S.S.W.; North point, N.E. ¼ E.; in 6¼ fathoms, a good berth, but if anything, rather far out.

"There are a great number of bullocks to be got at fifteen dollars apiece, but as we had no necessary money on board, aud the Portuguese not liking to take Government bills, we could not procure any."—*Commander P. H. Dyke.*

Quicinga (or *Quissinga Pequena*), 8 miles southward, is a cluster of native huts; you can seldom land here except in surf boats or bimbas.

Whale's Head, in lat. 11° 35′ S., is a dark-coloured point, projecting about a mile into the sea from the land on either side, forming the North side of a small indentation, called *Pigeon Cove;* about 2 miles to the northward is a remarkable piece of table land near the beach. At 1 mile South of Pigeon Cove is a large barracoon, and several smaller ones mark the site of *Quincinga* or *Quissinga Grande.* At 9½ miles S.S.W. of this is the entrance of the *Rio Tapado*, not easily made out, but there is a village here.

From Quicombo the coast runs S.W. by S. ¾ S., 39 miles, to *Logito River.* The shore is very bold, being formed of high, perpendicular, chalky cliffs, which are seen at a great distance when the sun shines to the westward of the meridian. You can run up the coast from Lobito to Quicombo, within a mile of the shore, without having soundings with the hand lead.

Logito River (*Egito* or *Egypto*), in lat. 11° 58′ 30″ S., long. 13° 45′ 15″ E., is 25 miles N.E. by E. from Lobito Point, and is said to rise near the town of Egito, 60 miles inland. It is an excellent watering-place when the sea is smooth; the water, coming from the mountains, is perfectly wholesome, and better than at any other place on the coast. The most expeditious plan is to haul the casks off to a boat anchored ouside the surf, and then raft them off to the ship, which cannot approach nearer than 1¼ mile from the shore. Here are some Portuguese factories for orchilla, &c., where live stock may be obtained. Logito may be known by the high bluff point which forms the South point of the bay, and by a large white house standing on the right of a deep gorge, half way up the cliff.

Anha, Hoanha, or ***Morombo***, is a small river 9 miles E. by N. ¾ N. from Lobito Point, running into a small bay, which may be known by trees close to the shore. There are several Portuguese residents trading in orchilla. You may anchor in 7 fathoms, with the river S.E. by S., 2 miles distant.

Anha is a large village to the northward of Lobito, and apparently, from what I could see from the ship, far more luxuriantly situated than any other place along the coast. There is a large river running down through the village, which adds much to its appearance, but in consequence of the heavy surf which invariably sets on the beach, it is impossible for man-of-war boats to land and procure water, even under the most favourable circumstances.—*Commander P. H. Dyke.*

LOBITO* is a very excellent and secure harbour, the best on any part of this coast. It appears to have been unknown, excepting to the slave traders, until it was discovered by Captain H. J. Matson, in H.M.S. *Waterwitch*, in 1840. Even the Portuguese vessels of war, and the military authorities, professed entire ignorance of such a place. An attempt has been made to remove the government establishments from Benguela to Lobito, and a fort and a custom-house are now established here. Water can only be procured in the rainy season; at other times it must be brought from Anha or Catumbela. Fish can be taken with a seine in great abundance. The beach on the N.E. side of the harbour is almost perpendicular, there being in most places 10 fathoms within 30 ft. of low-water mark. This harbour is not easily made out by a stranger, and a vessel might pass within 4 or 5 miles without perceiving the entrance. It may be known at a distance by a row of white marks on the hills to the northward; but the latitude (12° 20′ S.), or its bearing from St. Philip's Bonnet, E.N.E., 23 miles, is the only sure guide. It is high water here at $4^h 15^m$; rise, 5 or 6 feet.

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* *Catumbella das Ostras*, of Pimentel, or Cotovelo das Ostras, a large village with two factories, is said by M. de Kerhallet to be a cove or village, 4 miles southward of Logito; Captain de Lima and M. Valdez say it is the same as Lobito

"Lobito is a beautiful harbour, about 3 miles long, and 1 mile broad, with 10 fathoms all the way up, close to the western shore. In rounding Lobito Point, you may go within a few yards of it, as the beach is quite steep, with 10 fathoms water. In working up to the anchorage you ought not to stand over on the eastern shore into less than 8 fathoms, as it then begins to shoal very suddenly. It is a good place to cut wood, but you must first obtain permission of the Governor of Benguela.

"Bullocks and poultry are likewise to be obtained, and very good, the latter five or six for a dollar. Oysters are in great abundance on both sides of the river, at the head of the harbour, from the shells of which an immense quantity of lime is made, and I believe is principally exported to Benguela and St. Paul de Loanda. No water is to be got in the neighbourhood, otherwise it would be a famous place to heave a vessel down, or clear her out. In coming from the southward, you will see a rather large white building on the hill, which is the fort at Catumbela, and close to the northward of it there is a large niche in the land, which is very conspicuous, and is about 7 miles to the southward of Lobito Point. In coming from the northward or westward, you will see three white marks on the land joined together, which appear precisely like the arches of a bridge; they are close to the North side of the entrance of the harbour.

"The Portuguese Government were anxious, in 1842, to form a settlement there instead of Benguela, in consequence of the latter being so unhealthy, but were obliged to abandon the idea, after building some few houses, owing to not being able to find any water, and in addition to which it is also very unhealthy.

"There is about 6 ft. rise and fall of tide; the head of the harbour at low water is perfectly dry, and the smell is by no means agreeable, particularly of an evening, when the tide is out. There is an immense number of fish in the harbour, sharks amongst the rest, so one ought to be careful in allowing any person to bathe. I have seen five or six at once near the ship, and have had several in the seine, which have always broken through."—*Commander P. H. Dyke, R.N.*

Rio Catumbella (or Cata-Bella), enters the sea at 9 miles S. by W. ½ W. of Lobito Point, and 6 miles E.N.E. of St. Philip de Benguela. The entrance is barred, and is conspicuous from a remarkable opening in the hills, 4 miles inland, through which the river passes. It is most clearly seen when bearing East or E.S.E. A white fort at the entrance of this gorge also points out the river. Inland, the river has considerable dimensions, and is said to have a course of 180 miles, rising in the South in the mountains of Caconda. It is subject to great inundations in the rainy season, and is very unhealthy. Stock of all kinds may be procured from the village at its entrance.

SAN FELIPPE DE BENGUELA (or Cidade de San Felippe de Benguela), capital of the province or kingdom, was a place of considerable trade, and next in consequence to St. Paul de Loanda. It was the last of the Portuguese settlements on this coast, is frequented chiefly by the Brasilians, and is situated on a plain fronting the sea, containing about fifty houses, built in the old Portuguese style, tiled and whitewashed, but composed chiefly of mud, and now falling into decay. A fort is situate to the left of the town, mounting twenty-eight pieces of small calibre, but in a most dilapidated state. There are two churches, but one is in ruins. The dress worn by the natives is a scanty piece of blue cloth thrown loosely round them, adorned with beads and various trinkets of European manufacture. Others are entirely folded in lion and leopard skins. The slave trade has been here carried on to a great extent, but its vigorous suppression has caused the former prosperity of this place to disappear.

Commander V. L. Cameron, R.N., reached this place in November, 1875, after his arduous march across Africa from Zanzibar. He describes the town as being nicely kept and clean in appearance; it has also a good hospital, and is evidently regaining some of its former prosperity.

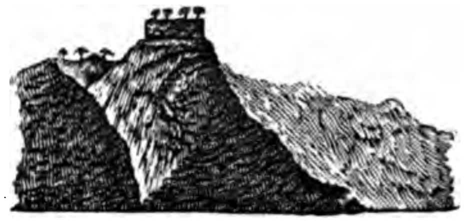
The population amounted to 2,438, arranged as follows:—whites, 38 men, 1 woman; 85 males, 94 females, free coloured—179 in all; free blacks, males 560, females 510; slaves, males 520, females 630.

The soil is perfectly barren; not the slightest appearance of vegetation, excepting near the River Catumbela. On leaving this anchorage, a vessel should not bring the town to bear to the westward of South, until she is 4 or 5 miles distant; she will then be clear of the shoal to the northward. The anchorage is abreast of the fort, in 4½ fathoms, and three-quarters of a mile from the shore. A small *fixed bright* light is reported to be shown from the fort.

Elephants, lions, tigers, and various other wild beasts, are abundant in the vicinity, together with crocodiles, alligators, and numerous serpents, with other reptiles. The country around abounds with excellent fruit and vegetables, but the water is not of the best quality, nor can it be procured without some difficulty, by baling it from wells of considerable depth, at about 300 yards from the beach. Good water may be procured from Caboto River. In December, 1825, no rains had occurred at the usual season for two years, and the inhabitants were entirely dependent upon St. Paul or Angola for the necessary supplies, instead of, as heretofore, furnishing that place with all kinds of provision.

Of Benguela Bay, which was formerly called *Bahia das Vaccas*, or *de Sant Antonio*, the West point is a most remarkable headland, called by the Portuguese *Punta do Chapeo;* and by our seamen, the *Bonnet of St. Philip*. It appears to be a clump of trees, which are so close and thick that they seem to have been cut with a pruning knife into the shape of a beefeater's bonnet; and, though they are luxuriant, all the neighbourhood is quite barren. The point on which they grow is considerably elevated, and can be seen at a great distance. It is composed of materials like those of the cliff below, and covered with shrubs and verdure. The land in the bottom of the bay is double, high, rugged, and barren, except the valley close behind the town, which is covered with verdure.

The annexed view of St. Philip's Bonnet, at 2 miles distance, when it bore W. by S., was drawn by Captain Dazel in 1790. The trees at the top have since grown thicker, and now appear as one close mass.



St. Philip's Bonnet and the town of Benguela are nearly on the same parallel, at the distance of 6 miles from each other; but the bay, from its extreme eastern and western points, is nearly 7 miles broad, and about 2½ miles deep to the beach. Within the transit line of the two points, and more than halfway over to the East, the depth of water is 17 fathoms, and the depth gradually decreases to 6 fathoms within a mile of the shore. The best anchorage is in 10 fathoms, with the flagstaff and western church in a line. When St. Philip's Bonnet bears S.E. you may steer directly for it, and having passed at any convenient distance, proceed into Benguela Roads.

On nearing Benguela from the *southward* in November, 1825, the water, every evening, appeared to be nearly white, and, when agitated, emitted the most brilliant phosphoric coruscations. Here was picked up a number of molluscæ, possessing a perfectly new character, being shaped like the *biche do mar*, cylindrical, and terminating in a blunt cone, open at one end, and hollow as far as the conical projection. Some were a foot long by about 2 inches in diameter, perfectly flexible, and, upon being placed in the hand, gradually dissolved like ice; but when set in motion, either in or out of the water, became vividly luminous.

On the 30th of November, 1825, H.M.S. *Leven* arrived at Benguela, and the following is Capt. Owen's description:—The town is situated on an open bay, formed to the S.W. by a projecting point of cliffs, above which is *Monte Sombreiro*, known more generally by the name of St. Philip's Bonnet. The town is situate in a marsh of stagnant pools, which in the wet season is almost inundated, and, of course, very unhealthy. The natives in the interior will not allow the Portuguese, or *any other people with straight hair*, to enter their territory. No sheep were seen, but goats and bullocks were in great abundance —the latter of a small species. Lions and tigers are very numerous in the surrounding country, and hippopotami and alligators in a small river near the town; elephants common, but sometimes scarce.

After the vigorous efforts made to suppress the slave trade, Benguela declined very much, until it became a mere wreck, but legitimate commerce restored in some degree its trade. Wax, ivory, gum-copal, skins, &c., are brought from the interior, and the copper mines have also been one of the sources of its prosperity.

The immense and desert coast between Benguela and the Cape of Good Hope is yet imperfectly known, and has not been perfectly surveyed.

To the West of St. Philip's Bonnet is a bay, limited to the West by Point San José, which is low and sandy. A palm tree stands about three-quarters of a mile within it, and is the only mark to distinguish it in coming from the West. The bay is 4 miles wide, and separated into two by a rocky point. To this bay the name of *Bahia Tarta*, or *Torta*, is given; but Capt. Kerhallet limits this title to the western half, calling the eastern portion Bahia das Vaccas, which, as before stated, is the original name of Benguela Bay. *Rio Marimbemdo* (or Vittoria River) falls into it. There is excellent anchorage in these two bays. In one of these a boat belonging to the *Waterwitch* remained concealed for nine days, watching a slaver in Benguela Roads, which she captured on her leaving the anchorage, with 390 slaves on board.

"Between Benguela and Point Salinas is *Rio Vittoria*, or *River Victoria*, which is nothing more than a small creek, extending considerably into the interior; the banks are extremely beautiful, and covered richly with verdure. Near this place, in 1825, was seen a large herd of cattle, and shortly afterward, to the northward, a village, containing about thirty huts of the rudest construction, built of mud, the largest not more than 8 ft. high, with a little oval-shaped entrance about 3 ft. On the beach were several boats of a rectangular form, and several natives, quite naked. Continuing along shore northward, many fishing canoes appeared, and another village of much greater extent and neater construction than the last. One house in particular was large, well built, and whitewashed; from which, and elephants being very numerous hereabout, it may be supposed that they have some communication with the Portuguese of St. Philip or Benguela."

Salinas Point, 22 miles W.S.W. of Point San José, is a piece of low, flat, sandy land, extending 5 or 6 miles beyond the high land, and has a remarkable tree at its extreme point, which much resembles a sail, and is frequently reported as such. There is a reef to the southward of it, and the water between it and Luash is shoal; but to the northward of the point the shore is very bold, there being 10 fathoms within a cable's length of the beach. It is, however, dangerous to approach it by night; for the beach being of white sand, and projecting so far from the high land behind it, is difficult to be seen until very close. Many vessels have run on it on a fine, clear night.

To the northward of the point, at 5 or 6 miles distance, a settlement has been formed, where a large quantity of salt is made and exported, chiefly to St. Paul de Loanda and Benguela.

The coast between Salinas and St. Philip's Bonnet was not minutely surveyed by Captain Owen, or so imperfectly as to mislead strangers. This defect was obviated in some measure by the sketch made by Commander Alan Gardner, in 1853. The course from Salinas to St. Philip's Bonnet was given as E. by N. ¾ N., but it is not possible to make a direct course between these two points, the land between them forming the segment of a circle. The English schooner *Harrington* was totally lost on this beach in March, 1843; she had taken the bearings of St. Philip's Bonnet at $6^h\ 30^m$ p.m., and at $7^h\ 30^m$ she was aground.

A stranger having made the high land of St. Philip's Bonnet before dark, bearing E. ½ S. or E. ¾ S., 15 or 18 miles, would not see the intervening low land, and would perhaps steer directly for the Bonnet; or he would consider East to be a very safe course; but even this would take his vessel on the beach, off which there is no anchorage. One remark may be made, that the current will drift a vessel rather off the coast.

Loacho, or *Luash*, in lat. 13° 0′ S., long. 12° 59′ E., is a very snug harbour for small vessels, completely sheltered from all winds by a ridge of rock, at the extremity of which is a rock, pierced with two arches, appearing like a bridge. There are several white factories on the shore. It was here that the slave vessels belonging to Benguela generally embarked their slaves.

"*Luash Bay* is a good anchorage, but in general there is a deal of surf on the beach. What I consider the best anchorage is in 7 fathoms, with the bridge bearing S. by W. ½ W. half a mile. The anchorage farther in, under the lee of the bridge, appears occasionally to be good, with beautifully smooth water; but when the rollers set in (which is, I am given to understand, at the full and change of the moon), I think, from what I have seen, that even this vessel would almost touch the bottom, therefore do not consider it safe anchorage for men-of-war. There are plenty of good bullocks to be got, but no water."—*Commander P. H. Dyke, R.N.*

Equimina, or *Camena Bay*, in lat. 13° 9′ S., long. 12° 53′ E., is a large bay, about 4 miles eastward of Elephant Bay; but ships going to anchor there should be extremely cautious in not having too much way on the vessel, as you do not get soundings until close in, and then from 15 fathoms rapidly to 3 fathoms, at about half a mile distant from the beach. There are two Portuguese establishments here. There are two villages in the bay, where bullocks, fruit, and vegetables may be procured.

"The first time I went there I got far too close in, and was obliged to warp farther out, so ever since then I have invariably sent a boat in and anchored her in 8 fathoms, so brought the vessel to anchor close to the boat; but on one occasion, even then, although I dropped my anchor close to the boat, and only veered to 20 fathoms, I had only 4 fathoms under the stern.

"I found nearly in the centre of the bay, close down to the beach, merely the bed of a large river, but by digging holes in the gravel the water flowed in rapidly. I dug three each time, about 6 or 7 feet long and 3 feet deep, and although I kept filling casks and breakers during the whole day, the water did not appear to diminish in the least; and I must say, I think the water was as good as any I ever tasted. The best time for watering is the morning, before the sea breeze sets in, which is very irregular as to time; but after that there is often a nasty surf on the beach, which hinders the watering.

"In a couple of days I got on board this vessel 32 tuns. This country all around abounds with lions, zebras, and deer, which came down and drank at the places we dug, after our departure in the evening.

"The Rocella (scarlet dye) trade appears to be the only one, with the exception of that of slaves. The land to the northward is steep, and quite white, apparently chalky soil, and terminates in a high bluff, which forms the northern entrance of the bay. The white cliff may be seen at a great distance, and, after having once been seen, can never be mistaken."—*Commander P. H. Dyke, R.N.*

ELEPHANT BAY (*Bahia da Torre*) is one of the best anchorages on this part of the coast; it is perfectly secure, and sheltered from the only winds that blow, the South and S.W. It may be known at a great distance by a very high piece of table land near the bottom of the bay, and under which is the best anchoring ground; that near the eastern shore is rocky in some places. Near the top of the table land the names of several of H.M. ships have been built of stones and whitewashed; they can be read 15 miles off, and form a very conspicuous mark for the bay. The rollers, or caléma, which occasionally set in along the whole coast, are not felt in this bay. Fish can here be procured by the seine in great abundance, and the hills abound in game and wild animals of all kinds, which, owing to there not being any inhabitants, are remarkably tame. This is by far the best place on the coast for refitting and refreshing the ship's company after a cruise. I have repeatedly anchored here for a few hours, merely for the sake of giving the men a run on shore, to wash their clothes, to bathe, and haul the seine. It is the only place where this can be done with impunity, but sharks are sometimes seen. The climate is very salubrious, as is the whole coast to the southward of Salinas. Before anchoring in this bay to refit, it would be as well to procure a bullock or two and some vegetables at Little Fish Bay (lat. 15° 13′ S.), or at Equimina to the westward, which can be purchased there on very reasonable terms.

Water cannot be procured in Elephant Bay, excepting during a rainy season, which sometimes does not occur once in five years; there was not any rain whatever during the years 1840-41-42; but I have been informed that, when the rains do set in, they continue incessantly for weeks together, and the country then becomes almost inundated. The appearance of a large number of watercourses seems to corroborate this statement. The *Rio Coporoco* is marked as falling into it, and a Portuguese factory is established in the bay. Excellent oysters can be gathered from the rocks on either side of the bay.—*Captain Matson.*

Friar's Rocks (Os Frades), three rocks about 2 cables from Friar Point, the West point of Elephant Bay, are in about lat. 13° 12′ S., long. 12° 49′ E., and about 12 or 14 ft. high.* Between them and Cape St. Maria is the village of Calunga.

"*Elephant Bay* is by far the best and finest bay all along the coast, with capital anchorage. I always anchored in 7 fathoms, about 3 cables' lengths from the high land, close up in the corner. The water is perfectly smooth, and the wind always blows off the high land. I took the opportunity of careening the vessel, and putting some sheets of copper on the bottom well under water. The only drawback to the place is the want of water, not a drop of which can be got even by the settlers for their own consumption; they are obliged to send to Cama Bay for it, a distance of 6 miles.

"Fish of all sorts are in great abundance. I frequently caught with one haul of the seine more than sufficient for the whole of the crew. During the time I was there I established a regular signal post on the hill, from which I could see at least 45 miles on a clear day; and should recommend others to adopt a similar plan, should they be going to remain any time there. In the neighbourhood of Elephant Bay the land is very mountainous, with flat table land; at the southern entrance are the rocks called the 'Friars' Rocks,' with deep water close to them. In coming from the northward, the land, about 6 or 7 miles from the bay, appears quite white, like chalk, and may be seen for a considerable distance. There is not the slightest danger in approaching the land anywhere along the coast in that neighbourhood, as there is deep water close to the land all along.

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* The description of the coast between this and the Congo has been corrected from the observations of Commander H. J. Matson, H.M.S. *Waterwitch*, 1839—1843, &c.

"There is a rise and fall all along the South coast, of about 5 feet. The westerly winds generally prevail. The current, from what I have observed, *never* sets to the southward, occasionally to the eastward, but principally to the N.N.W. I was set one evening, when between Capes St. Maria and Martha, at the rate of 1½ mile an hour to the eastward."—*Commander P. H. Dyke, R.N.*

The coast E.N.E. of Cape St. Maria (on which is a pillar) forms another bay, the shore of which is steep, with a sandy strand; and here, at a short distance off, no bottom is to be found with a line of 50 fathoms. This is called *St. Mary's Bay*, and is destitute of fresh water. In the centre of the bay is a white islet, westward of which is the anchorage, but only suitable for vessels of small size.

This part of the coast was visited by Captain Chapman, in H.M. sloop *L'Espiègle*, March, 1824, and communication had with the natives, who proved deceitful, and who seemed to have not the least idea of any language but their own, although so near to the Portuguese. Little cultivation of the interior could be seen.

CAPE STA. MARIA, the Cape San Roque of the old charts, is in lat. 13° 26′ S., long. 12° 35′ E. It is of moderate height, and surrounded by higher land. Some white patches, in the small bay of Sta. Maria, point it out from a distance. A black rock, rising 50 ft. above the water, called *Ilheo de Pina*, lies at 3 miles South of the cape, and 1½ mile off the mouth of the *Rio Padrao*, or *S. Joao.*

From Captain Owen's voyage we learn that the *Barracouta* sailed round Cape St. Maria within about 50 fathoms of the rocks. On the western side of the cape were seen three beautiful coves or bays, capable of affording excellent anchorage. The mountains from this cape northward to Elephant Bay are of granite, interspersed with a great quantity of mica and quartz; one of the cliffs, abounding in the former, reflected the sun's rays to a considerable distance, like a vast mirror.

"Continuing her course toward Benguela, the *Barracouta* passed the low sandy point of Victoria, or St. Francis; after which, several villages of straw huts were seen. Off one of these the sloop hoisted her colours, which the inhabitants acknowledged by holding up a small red flag, with a black or blue cross upon it. Here the country was generally much more diversifi valleys fertile and beautiful, studded with huts, but which, from th construction, indicated no advance in civilization."

CAPE STA. MARTHA is 30 miles S.W. ½ S. from Cape St. Mari of moderate height. The coast between is high and precipitous, i at intervals with deep ravines, apparently the channels of torrents rainy season; and there is a depth of 60 and 70 fathoms near the shore. Between these capes the old charts mark a river, the *Rio Gubero*, which was considered as the southern boundary of Benguela, but this is now placed at Cape Negro. The bay to the N.E. of the cape is called Bahia Vermelha, where some slave barracoons were erected. The only anchorage in this bay is in *Espiègle Cove*, on the South side. At Cape Sta. Martha the high cliffy nature of the coast ceases, and to the southward the shore presents a succession of sandy beaches, separated by low cliffy points.

At 6 miles southward of Cape Sta. Martha is a small bay, called *Bahia das Matillas*, but it affords no shelter. On the chart of Captain de Lima this is called *Enseada da Lapa*. It is sometimes called *Carangumba*, and a barracoon has been built on it. About 9 miles southward of Das Matillas Bay is *Tiger Bay*, perfectly sheltered from the prevailing S.W. winds and swell, but its position is difficult to recognise. The S.W. point of the bay, which is very low, should be rounded a mile off, in order to clear a shoal bank which extends some distance in a northerly direction, and then steering in to the S.E., anchor in 6 or 7 fathoms. This anchorage offers no resources, as the plain which surrounds the bay is without vegetation or water. There are, however, numerous tigers, deer, hares, and partridges.

Do Velho Bay, 9 miles to the southward of Tiger Bay, is exposed, and affords no shelter. *Mount Do Velho*, or *Old Man Hill*, stands on the South side of the bay, and from its remarkable truncated form is an admirable mark for making Tiger Bay. At 15 miles southward of Mount Do Velho, is *Mount Redondo*, a mountain of a rounded form, often mistaken for Mount do Velho.

From the Old Man to *Cape Euspa*, the North point of Little Fish Bay, the bearing and distance are S.W. 46 miles, and between them are two sandy coves, named *Moscas*, or *Flies Bay*, and *Tartaruga*, or *Turtle Bay*, divided by *Cape Gertruda*, and in the latter of which anchorage may be found in 10 to 13 fathoms. Of Turtle Bay, in about 14° 54′ S., the shores are fertile, with every appearance of being inhabited. Between this and Cape Euspa is a small bay of similar description, having good anchorage, called *Bahia das Pipas*, because, in 1842, the Portuguese commandant here burnt a large number of casks, intended for slave ships.

BAHIA DE MOSSAMEDES, Little Fish Bay, or *Angra do Negro*, is the most southern station of the Portuguese dominions in Western Africa. The original name was Angra do Negro, afterward called by the English Little Fish Bay. In August, 1715, the Captain General Barao de Mossamedes despatched Colonel Luiz C. C. P. Furtado to explore the coast South of Benguela with an expedition, and this bay was one of his discoveries, which, it is stated, were excellently recorded, and exactly observed. The name of the Portuguese governor was intended to be imposed on it, and an establishment founded, but this did not take place till January 20, 1840, when a presidio was formed on its South side.

The Bay of Mossamedes is bounded on the North by *Cape Euspa*, or *Girando*, and to the South by Point Annunciaçao, 6½ miles apart, N.E. by E. and S.W. by W. The bay penetrates about 6 miles within this line.

Cape Euspa, in lat. 15° 7′ 30″ S., long. 12° 9′ 20″ E., has nothing remarkable, but is low and dark-coloured. From this the rocky shore runs 3 miles S. by E. to *Ponta Redonda*, or *Giraul*, of moderate height, and very steep-to.

At 1 mile North of it is the mouth of the *Rio Quenina*. At 1 mile southward of Ponta Redonda the depth is 140 fathoms, and close to it 20 fathoms, this depth diminishing suddenly towards the South side of the bay, and, therefore, there is no anchorage on its North side. From Ponta Redonda the coast trends to the eastward for about a mile, and then follows a sandy beach, forming the arc of a circle facing the West, and terminating at *Ponta Negra* at the South. At 2 miles S.E. by S. of Ponta Redonda is the mouth of the *Rio Béro*, or *Belo*, just to the South of which are the gardens and a chalybeate spring. At a mile from it, on the sandy beach, stand the houses of the settlement.

On the summit of Ponta Negra stands the fort of San Fernando, and near it the quarters of the presidio. To the westward of the point the coast forms a small bay, bounded on the West by a high, rocky cape, called *Ponta Grossa*, or *Noronha*. It is perpendicular, and indeed overhangs its base. On its summit is a lookout house, painted white, and a flagstaff. The best anchorage is in the small bay between Ponta Grossa and Ponta Negra.

From Ponta Grossa the rocky shore ceases to the West, and forms another bay, bounded by Ponta de la Annunciaçao, 3 miles distant, which is low, sandy, and difficult to make out. In this bay is a very dangerous, rocky, and sandy bank, on which there is not more than 10 ft. water, and in some places not more than 2 or 3 ft. It is called the *Amelia Bank*, from a Portuguese war schooner which was lost on it in 1846. Its North end lies with Ponta Grossa bearing S.E. by E. ½ E., about 11½ cables distant. It may be avoided by keeping Ponta Negra bearing S.E. ¾ S. a little open East, or to port of Ponta Grossa, which will lead half a mile N.E. of it.

The anchorage in Little Fish Bay is perfectly safe, being sheltered from all winds, excepting those from North to N.W.; it is easy of approach, as the sea breeze blows across the bay, thus making a leading wind in and out. In the southern part of the bay there is a moderate depth of water, and good anchorage may be had in the small bay between Ponta do Noronha and Negra Point, in from 5 to 7 fathoms, about equidistant from the look-out house and Fort San Fernando, with the latter bearing S.E. by S. ½ S.

The colony of Mossamedes is rapidly increasing in size and importance, and there are many establishments in the country owned by Portuguese colonists, who farm the land, which produces abundantly. Cotton, too, is grown of good quality, also sugar and coffee. If the succeeding governors possess the same intelligence, administrative capacity, and desire to inprove, as the present one, Lieutenant-Colonel Fernando da Costa Leal, exhibits on all occasions, Little Fish Bay will become a most important colony of the Portuguese crown.*

It was first colonized by immigrants from Madeira and Brasil. In 1857, a large number of Germans were sent out by the government, and they were established at Huila, in the interior, and their settlement was then called *Vista Alegre*. It stands on the mountains, and is supposed to be healthy. Sugar, cotton, and horses, are among the products, rapidly increasing in importance under Colonel Leal's care.

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* Commodore A. P. Eardley Wilmot, Oct. 25, 1864, in Parl. Papers, 1865, lvi., p. 155.

Bullocks are good and cheap, and sheep, pigs, and fowls may also be procured; and fish in any quantity can be caught with the seine, the best time being early in the morning. Orchilla, ivory, gum-copal, and wax, are the principal exports. Vegetables and fruit are, as a rule, abundant though dear.

The watering place is at the River Béro, 1½ mile from the anchorage; here the boats can lie alongside the bank, and the casks may be filled with a pump and hose. The best time for this is in the morning, before the sea breeze sets in. During the caléma, or rollers, the water becomes brackish. The climate of the bay is healthy, except near the watering place, where there is some stagnant water. The village is in the bay near the anchorage. There are a large number of natives established in and around the bay. They appear a fine and intelligent race of blacks, called Mocoroca, of the Mucubal nation. They cultivate maize, and have large herds of bullocks and sheep.

Near Point Annunciaçao, hills and high cliffs begin along the coast, which extends 22 miles S.W. by S. ¼ S. as far as the entrance of *Rio dos Flamengos*; and about midway stands *Monte Negro*, which is conspicuous at a considerable distance.[*] Rio dos Flamengos, the bed of a torrent, issues from a gorge into an exposed bay, called the *Bay of Cape Negro*. On the North bank of the river, a few miles inland, is the village of Lonchaut.

CAPE NEGRO.—The coast now trends 5 miles W. ½ S. to *Cape Negro*, a headland distinguished by a pillar of alabaster, with the arms of Portugal, erected by Bartholomew Diaz, in 1486, and which stands in lat. 15° 40′ 42″ S., long. 11° 58′ 18″ E., according to the survey of Captain Owen, 1825. It is the southern limit of the Portuguese domination, and near this spot the first trees were seen after leaving the *Cape of Good Hope*. Some bullocks were seen, but no huts or natives. At 4 miles S.W. of Cape Negro is a bold cliff, projecting from the interior like an immense wall. It is 134 ft. high, and being visible for 20 to 25 miles, is a good mark for Port Alexander. It is called *Sand Cliff*.

At *Cape Negro*, in November, 1825, on approaching from the *southward*, the climate seemed to have changed, and the desert partially ended. The first tree (a palm) for many hundred miles was then seen, as also a hut and a native: the heavy sea and the boisterous and cold weather that had before prevailed, changed into smooth water, and a mild, pleasant temperature. The cape is formed by a precipitous mass rising at the extremity of a low projecting point, and resembling an island. It is incrusted by horizontal strata of different coloured earths and sand. On its summit was seen the pillar, or the remains of the small marble cross, erected by Diaz. The precipice abounds in fossil shells of various species, the most remarkable being of a spiral form.

PORT ALEXANDER, at 8 miles S.W. ½ S. from Cape Negro, is a snug harbour, with excellent anchorage, in which ships may ride safely at any season of the year. The peninsula, forming the harbour on the North and

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[*] Proceeding southward, from Mossamedes Bay, the rocks upon the coast appear of two or three different kinds, but principally sandstone, in horizontal strata, in which fossils are imbedded; others are of primitive or volcanic substance, of harder and more irregular structure. In the dry season many rivers appear to be completely blocked up by sandy beaches, but which may, in the rainy season, be broad and rapid streams. Farther northward the land is composed of red intermixed with tinges of blue clay and yellow sand.

West, is a low sandy tongue of land. The outer limit on the East is the high sandy cliff, and the coast thence northward to Cape Negro is of a similar description. The N.W. part of the harbour is shallow; but in other parts the depths are 18, 17, 16, and 15 fathoms.

Sandy or *Bateman Point*, the extremity of the peninsula, may be passed close-to on the East side, as well as the whole of the continental shore of the port; but the southern shore of the peninsula is guarded by a bank which extends to the West of the port, and shows, from the different colour of the water. Point Alexander is easily made out in coming from the North, from the cliffs, &c., before mentioned; but the approach from seaward to the South will be connected with some uncertainty, as the Sandy peninsula will be confounded with the mainland. The masthead look-out, however, will be able to see the port over the sandy neck. Allowance must be made for a slight northerly current. In coming either from North or South, an outer bank, called the *Ringdove*, or *Dormer Bank*, must be avoided, which lies on the meridian of Sandy Point, and 1¼ mile off from it, on which the least water is 3 fathoms. To clear it, keep half a mile from the shore of the peninsula, or still better, coming from the North, within that distance of the shore of the main land. It is high water, on full and change, in Port Alexander, at 3ʰ; tides rise 4¾ ft. There is an abundance of fish in the bay; and fresh water may be procured by digging in the sand on the South side of the port. The nearest inhabitants are at a village called *Coou*, 9 miles E.N.E. of the anchorage. A few miserable natives are sometimes seen here and bullocks and sheep may be procured from them.

Captain Messum describes the line of coast between Great Fish Bay and Port Alexander as so free from danger as to allow a vessel to approach within half a mile. One small indentation alone is to be found between these places.

From the entrance of Port Alexander the coast runs to the West for 3 miles, and then S.S.W. 4½ miles to *Cape Albina*, which is formed by some remarkable steep white cliffs, which, with the rays of the setting sun upon them, resembled a group of Grecian columns in ruins. Thence the coast trends to the S.S.W., to the entrance of Great Fish Bay.

VI.—HOTTENTOTIA, ETC.

The countries between that last described and the Cape Colony are inhabited by different tribes, which it would be beyond our limits to describe. The coasts have been named according to the people who live on it thus:—

Cimbebasia, the country of the Cimbebas, extends from Cape Negro, or Great Fish Bay to Cape Cross; and *Hottentotia*, that of the Hottentots, thence southward to the Orange River.

A portion of this coast suddenly sprang into great notoriety in the course of the year 1843, from its being the depository of the manure called guano*. We subjoin a few general notices of the coast previous to giving the particular descriptions of it.

At about Cape Negro commences that region of desert and arid sands which extends to beyond Ichaboe, resembling, in their aspect from the sea, the Great Sahara of Africa in the northern latitudes. The whole of this coast and country is nearly rainless, but at times heavy dews prevail. The origin of this intense aridity is the long continued action of the vertical sun, which is near the tropics for so long a period of the year, that between the latitude of 20° and the tropic he is vertical 62 days, being less than one-sixth of that time over any similar extent of latitude. Besides the dryness arising from this long continued powerful solar action, the West coast of the continent is far removed from the origin of the rain clouds borne by the trade winds, which being deposited during their transit over the continent to the eastward, before reaching the West coast, they have parted with all, or nearly all, their moisture. It is to this fact of the solar intensity and the previous deposition of the rain, that the guano deposits are owing; the qualities of which accumulations would be entirely destroyed by the influence of rain. Good guano has only been found in three similarly situated localities, that on the *West* coast of Africa; on the coast of Peru, the *West* coast of South America; and on the *West* coast of Australia, all within the same latitude, and consequently under the same climatological influences.

The coast northward of the more settled districts of the Cape Colony have become much better known of late years than formerly, when we had only the very cursory and incomplete examination made by the unfortunate expedition under Capt. Owen, as a guide.

The guano trade drew much attention to it, and Captain W. Messum examined it throughout, in search of guano and nitrates. His journal and survey were given to the world in the excellent works by Mr. Charles John

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* The places on the West Coast of Africa, on which guano has been found, are as follows:—From a small rock in Sandwich Harbour, a few tons, of bad quality, were removed. From Hollam's Bird Island, a few hundred tons were procured with difficulty. From Mercury Island, about 1,500 tons. Ichaboe is the next in succession. In Angra Pequena, Penguin and Seal Islands afforded about 3,000 tons, of indifferent quality. From a small island southward of Pedestal Point, about 8,000 tons were removed between July and October, 1844. From some small rocks between Possession Island and Pedestal Point a small cargo was taken. Possession Island afforded 4,000 or 5,000 tons, of very inferior quality. From the Albatross Rocks, South of Possession Island, a small quantity was removed in 1845. Between Cape Voltas and Possession Island, from a small island, called Plum Pudding Island, about 2,500 tons were taken. From Olifant Rock, at the mouth of the river of that name, 1,500 tons of excellent guano have been removed by Government license. In Donkin's Bay there are some detached portions scarcely worth removing. On some detached rocks, in St. Helena Bay, called the Paternosters, about 3,000 tons were removed. In Saldanha Bay, a deposit of good guano has been removed, under Government superintendence, from Mallagassen Island. About 3,000 tons have been taken from Seal Island, in False Bay; and about the same quantity exists on Dyer Islands, near Cape Agulhas; and on the Bird Islands, in Algoa Bay, about 60,000 tons, very wet, and of indifferent quality, has been entirely removed. It is believed, after a minute search, that guano does not exist in any quantity on any other part of the African Coast.

Andersson,[*] quoted below. Besides these we have the very interesting narrative of Mr. Thomas Baines,[†] the well known traveller and admirable artist, who has been alone in delineating the borders of Inner Southern Africa.

The *natives* would require too lengthened a description for this work. Their very singular character, habit, and appearance, are amply described in the volumes just quoted, as well as in other works. Generally they are harmless, not having been subject to the vitiating influences of the slave-trade, which here had so marked an influence on the people within the Portuguese limits. But they are of very little service to civilized man, and moreover are very sparsely distributed.

Game is very abundant in most places, and an account of a journey is but a narrative of continued encounters with wild and ferocious animals, or with large herds of the deer and antelope tribe, or of vast flocks of birds.

The *South African Current*, described in the early part of this work, is always running to the *North*, and the general direction of the wind being the same, render it necessary for vessels proceeding to any part of this coast to make the land to the southward of their port, as it is very difficult to work to windward against the current.

Ships running along the coast will often judge themselves farther off shore than they really are, on account of the light sandy colour of the coast, and the extreme haziness of the atmosphere that generally prevails.

As the rollers frequently set upon the coast from the westward with great fury, and there is almost always a tremendous heavy swell thundering upon the shores, it is advisable to give the shore a good berth, except in making the harbours. This remarkable swell, which incessantly sets in from the W.S.W., renders it very unpleasant for ships in calms, which often prevail in the night.

Heavy squalls and gales of wind are frequent on this coast, and often come on without warning, and with a cloudless sky. Sometimes the sand is blown from the desert in large quantities, filling the air with minute particles, which are a long time subsiding, and accompanied by intense heat. These are sometimes disastrous and fatally destructive.

It has been reported that this Western Coast of Africa is entirely destitute of fresh water, and that none is to be found between the 16th and 31st degrees of South latitude. This is not the case, as fresh water is to be found on many parts of the coast, as indicated in the ensuing description.

At 10½ miles southward from Albina Point, the old charts place the *Rio Bambaruga*. The South point of the river, called by the Dutch *Point Cunegonde*, is uneven and of a black colour. Captain Messum could find no trace of it, but was inclined to believe, from the vegetation in a ravine, that a watercourse may at times run through the country.

GREAT FISH BAY, the entrance of which is 36 miles S.S.W. of Albina Point, is formed on the West by a peninsula of sand, 20 miles in length, and trending S. by W. This is called *Tiger's Peninsula*, and its North point is in lat. 16° 30′ 12″ S., and long. 11° 46′ E. The greatest breadth of the bay is at its entrance, where it is about 5½ miles wide. The eastern shore of the bay is formed of high, barren hills, of a brown sandy appearance. The depth at the entrance is 20 fathoms, near the middle 12 and 10 fathoms, decreasing thence gradually to 7, 6, 5, and 3 fathoms near the shore. Plenty of fish may be got there, and abundance of drift wood on the peninsula. The peninsula is all sandy, and the isthmus, by which it is connected to the main land, is not above one-third of a mile broad. Tiger Point may be rounded close-to, but care must be taken to avoid a bank with only 9 ft. water, extending upwards of a mile from the inner side of Tiger peninsula, and 7 miles from Tiger Point. There is also another bank with only one foot water on it, situated about 14 miles S.E. by S. ¼ S. from Tiger Point, and about 1¾ mile off the beach on the eastern side of the bay. When once at the head of this spacious harbour, and at anchor in 4 or 5 fathoms water, you may lie in perfect safety, with one anchor ahead, all the year round.

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[*] A Journey to Lake 'Ngami, &c., by Charles John Andersson, London, 1856. Also, The Okavango River, a narrative of travel, &c., 1861.

[†] Explorations in South-West Africa, in 1861—62, by Thomas Baines, London, 1864.

Great Fish Bay is formed by Tiger Peninsula, a long sandy tract of land, in no place 10 ft. above the level of the sea, and towards its southern extremity so narrow that the sea occasionally washes over it. Its central part is somewhat broader, perhaps 3 miles. The bay is about 18 miles in length, and in many parts it is rocky; its head, approaching from the South, may be seen several miles off. The water on its eastern side washes the base of the sand-hills, and contains several very fine mussel beds. In the survey made by Captain Owen, the bay is represented as perfectly safe; yet about 10 miles South from the point is a shoal, on which we struck, and knocked off 30 ft. of our false keel.—*Captain Messum.*

Great Fish Bay, like all the other bays on this coast, has undergone great changes, necessitating caution when navigating it. Its southern extremity has evidently been blocked up.—*Andersson.*

From the isthmus, or the South point of the peninsula, the land is bordered with downs, to the distance of 58 miles S.S.W., and forms several slender bays. Here, in lat. 17° 15′ S., is a river called Nourse River, which was discovered by *L'Espiègle*, in 1824.

Cunene or Nourse River only reaches the sea during the rainy season. Its mouth during the dry season is barred by a sand bank, on which the sea breaks furiously, particularly on its South point, called in the old charts *C. Ruy Perez.* The current out of it is very violent, and the tides may be felt 10 miles off during the rainy season; the flood setting E.N.E., the ebb, W.S.W. It is one of the largest rivers of S.W. Africa.

"This river" (the Nourse), says Captain Messum, "lies in a bight, and appears to flow into the sea through two rocky heads. Off the southern of these is a reef extending several hundred yards to the westward, sheltering, it would seem, a landing-place, as the water inside was smooth quite up to the river. The beach to the North is covered with large timber trees." An expedition was sent to explore it, in 1855, by the governor of Mossamedes.

Captain P. Heywood, in H.M.S. *Nereus*, January 27th, 1811, made the coast northward of Fish Bay, in lat. 16° 18′ S., which part appeared to be flat, sandy, and streaked perpendicularly with black and brown streaks. The ship was 8 or 9 miles off shore, in 12 fathoms, muddy bottom. From this spot, the whole of the coast in sight to the northward had the same brown sandy appearance; and it might be seen at the distance of 20 or 25 miles, were it not for its light sandy colour, and the hazy atmosphere that generally prevails. S.W. winds and a heavy swell rolling in from that quarter upon the shore render a near approach unsafe.

"November 28th, 1825. In Great Fish Bay. Nourse River was not to be found; not a trace of it was visible; neither was there any opening to the land for 30 miles on either side. From this it was inferred that the rainy season commences with the new year, when the waters force this passage, or river, in their course from the interior; and consequently Nourse River may be open at that season; but with the strong perennial winds it is again closed by the sand."—*Captain Owen's Voyage.*

The *Shoal of Antonio Casado de Viana,* said to lie at 200 or 250 miles from this coast, has already been described.

From Nourse River the coast runs nearly true North and South, and is safe, with the exception of a small shoal patch, in lat. 17° 50′ S., which extends about half a mile from a low beach studded with rocks.

CAPE FRIO (*Cold Cape*) is in lat. 18° 23′ S., long. 12° 2′ 20″ E. From Nourse River to Cape Frio the coast trends 53 miles S.S.W. and then South 16 miles. The land is high from this cape for 23 miles to the northward, but the shore is sandy and low, and thus likewise it continues for 50 miles to the southward from the cape, with a shore generally clean, and a depth of 13 and 14, 17 and 18 fathoms, at a short distance. To the North of the cape is *Angria Fria,* or *Frio Cove,* where the coast is low, with white sand, and you will have 30 fathoms, oazy ground, at 3 miles from the shore. The land near the cove is very steep, and known by three hills, the central one of which is the largest. The coast from Cape Negro to this bay is thinly inhabited.

From Frio Cove, the coast being all fair, with double land, trends to S.S.E., 18 or 20 miles. The sea side is full of trees, with sandy hills; you will have 16, 17, and 18 fathoms of water within 6 miles from the shore. This part of the coast is what the Portuguese call *Praya das Neivas,* or Snowy Beach.

The coast hence trends to the South, and Captain Owen's survey is here imperfect. He exhibits the coast, between the parallels of 19° 40′ and 21° S., as having a low sandy shore rising into elevated and mountainous land, with soundings of 20 to 16, 12, and 10 fathoms near the edge of the beach.

The coast was examined by Capt. William Messum, and we extract in the following from his descriptions as given in Mr. Andersson's work. In 1879 the coast hence to the southward, as far as Walvisch Bay, was examined by Commander J. B. Warren, R.N., and Lieut. H. Baynham, H.M.S. *Swallow,* whose remarks are embodied in the following description. The general results of the *Swallow's* examination show that the coast is apparently free from danger, except in lat. 20° 5′ S. and 21° 10′ S., where breakers extend 1 to 2 miles from the shore; there are no harbours, no places at which landing may be effected in ordinary weather, and no anchorages except those of a temporary character.

In about lat. 18° 27′ S., a point projects from the uniform land to the southward, between which and Cape Frio it makes a half moon sweep, forming a bay about 5 miles around. Under this point, which he called *False Cape Frio,* temporary anchorage may be had in 5 fathoms water, sandy bottom, by bringing the point to bear W.S.W. The shore here is low, a high block of rock, a detached mass from the mountain range, forming its background.

H.M.S. *Swallow* anchored to the northward of False Cape Frio in 8 fathoms, sand and mud, the cape bearing S. ¾ W., distant about 1¼ mile. Vessels should use this anchorage with caution, there being no shelter except with a southerly wind. It is not advisable to bring the cape to bear more westerly than S. by W.

To the southward the space between the beach and the sand-hills is about 2 miles broad, but in lat. 18° 42′ it becomes narrow, and at 8 or 10 miles inland is a range of rocky mountains of moderate elevation.

Between False Cape Frio and Fort Rock a line of soundings was carried by H.M.S. *Swallow*, at 1½ to 2 miles from the shore, the depths thus obtained being 9 to 12 fathoms; 8 to 10 fathoms is found close inshore till within a distance of 4 miles from Fort Rock Point, where foul ground with breakers extends W.N.W. about a mile. The shore presents an unbroken line of surf, the flat sandy foreshore rising to hills of irregular outline, apparently of 300 to 600 ft. elevation. There is no landing between False Cape Frio and Fort Rock Point; with no trace of water, nor of the country that came within sight being inhabited. A new port, with a good road leading from it into the interior, is said to have been found about 2 miles North of Fort Rock Point, but the coast for 6 miles North of Fort Rock Point was closely examined by the *Industry's* and *Swallow's* boats, without any trace of a port being seen.

Fort Rock Point, in about lat. 19° 6′ S., is a remarkable headland, so named by Captain Messum. It is the extremity of a low sandy point, with a large round block of granite close to it, which forms between the cape and the rock a considerable chasm. Round the sandy point is a cove, with a bar, enclosing smooth water, extending across its entrance, where there is said to be every facility for landing boats. Vessels, too, may anchor in 5 fathoms, bringing the rock to bear W.S.W.; but except in fine weather it would be dangerous to do so. The place is particularly worthy of notice, as well suited for the formation of a trading establishment or a missionary station.

Fort Rock Point is prominent, and cannot be mistaken; the outer rock is conspicuous for its whiteness, apparently caused by guano. The *Swallow* approached the breakers on the northern side of the point, and carefully searched for the anchorage which was said to exist there, but without success; the vessel then anchored in 8 fathoms, with the point bearing S.E. ½ S.; distant 1 mile. On three occasions boats were sent to search for the cove said to be situated to the northward of the point, and to effect a landing if possible, but after every exertion being used, they returned unsuccessful; and it is considered that there is no safe landing-place at Fort Rock Point.

It being the dry season—month of October—no trace of the river reported to be situated 6 miles South of the point could be seen; neither could the barrier reported in lat. 19° 19′ S. be seen.

The coast from Fort Rock to Cape Cross is apparently free from dangers, as, with two exceptions to be presently mentioned, soundings of not less than 10 fathoms were found within a mile of the shore. Flat rocky surf-beaten coast, with sand-hills of moderate elevation extending as far as the eye can reach, continues mile after mile.

At 6 miles South of Fort Rock Point the *Hoanib River*, of some magnitude, was seen meandering through a low sandy flat, and at 12 miles further South, the shore is fronted by a bar or recife, parallel with the coast, about a cable's length distant. South of this the coast assumes a bold outline, is very little varied by cover or embayments, and is pretty free from danger. Close in-shore no bottom with 20 fathoms. In lat. 20° 5′ S., are some reefs reaching 2 miles off the coast, called *Swallow Breakers*. When in the vicinity of this shoal ground, great caution should be observed, as the lead gives little warning; and it is possible that after a continuance of fine weather the sea may not break.

In lat. 20° 14′ S., a perpendicular sand-hill, about 500 yards long, was passed, in which were two openings having the appearance of periodical river beds, with a sand-bank extending two-thirds across the mouth, inside of which was a considerable extent of rushes and reeds. In about 20½° S., two remarkable rocky mountains may be seen inland—the *Cock's Comb* to the South, and the *Sugar Loaf* to the North, thus named by Mr. Andersson.

In lat. 20° 30′ S., long. 13° 19′ E., 27 miles southward of Swallow Breakers, is *Palgrave Point*, from which a line of breakers extends 6 or 7 cables to the N.W. H.M.S. *Swallow* anchored immediately North of the point, in 10 fathoms, sand and mud, the outer breaker bearing S. by W. ¾ W., and Sugar Loaf Hill E. ½ S. In this berth there is protection from the rollers, and with a S.S.W. wind it is considered safe, but a vessel should always be ready to put to sea on the approach of a S.W. gale. There is no landing-place.

In about lat. 21° S. the Portuguese charts place a harbour, named *Angra de St. Ambrosia*, but Captain Messum, after fifteen days' search, could not find it. He conjectured, therefore, that it had been filled up by the encroachment of sand. In about lat. 20° 47′ there is a remarkable break, of about three-quarters of a mile, in the sand-hills, evidently caused by an immense body of water at times rushing through their heavy heaps. Between lats. 20° 39′ S. and 21° S., is a series of bays, reefs, and rocks, the most southern of which is a bay of some depth, beset with many shoals. *Ogden Harbour*, reported by Capt. Morrell to be in lat. 20° 57′ S., he describes as a beautiful harbour protected by a reef, dry at low water, running 3 miles off to westward. A village of 200 inhabitants lies 6 miles E.N.E. from the head of the harbour, near which are many fine springs of good water. This harbour, however, is not shown on the charts, nor could it be found when searched for by H.M.S. *Swallow*, and it has probably been either washed away or submerged. *Ogden Rocks*, in lat. 21° 10′ S., over which the sea breaks, about a mile from the shore, are dangerous, and it is thought may be the remains of the missing harbour. Beyond this the coast is quite uniform and clear to Cape Cross.

CAPE CROSS, or Cape Sierra.—In lat. 21° 50′ S., long. 13° 57′ E., is *Cape Sierra*, or the *Cape Cross* of the recent charts. The shore is here similar to that which has just been described, and that southward of this cape is distinguished by white sandy hills. Cape Cross is in the form of a truncated pyramid of low elevation, of a red colour, and difficult to distinguish, near its extremity is an old stone cross. *Cape Cross Bay*, to the North of it, has good anchorage; the *Bay da Sierra*, to the South of it, is entirely open to the N.W. winds and swell. It is, however, used by whalers.

" Cape Cross, a rocky headland, projecting about a mile to the westward of the southern line of sea coast, forms a bay to the northward of from 2½ to

3½ miles in depth. From the point a reef, about 100 yards long, terminates abruptly in a depth of 10 fathoms water. On rounding the cape (from the South), fair anchorage is immediately found in 6 fathoms, but the best anchorage is to be had, after passing a slight projection from which another reef extends, about 1¼ mile further on. The best landing is abreast of a red sandstone rock."—*Mr. Andersson.*

H.M.S. *Swallow* found anchorage in Cape Cross Bay in 7 fathoms, fine sand, the cape bearing S.W. ¼ W. This anchorage, although fairly safe in moderate weather, is not a comfortable one, as the vessel lies broadside to the rollers. The sea breaks heavily on the cape, and there is no landing in the bay except after a continuance of the finest weather. Towards the interior the flat sand and rocky plains continue for some miles, rising into barren hills, and mountains, and at times, when the haze cleared away, Mount Dourissa could be seen.

At 27 miles S. by E. ½ E., from Cape Cross, is a rocky, blackish point of moderate height, surmounted by a sandy down, called *Point Farilhao*, in about lat. 22° 9′ S., long. 14° 17′ E. About half a mile off it are two volcanic rocks, the *Farilhaos*, which clearly distinguish it. *Rock Bay*, of which Point Farilhao is the North point, is used by whalers, but we have no particulars of it.

Directly inland, about 21 miles N.E. by E. from Cape Cross, is the highest and most conspicuous peak of the whole black mountain range, which runs parallel with the coast. It has been named *Mount Messum;* the Damaras in the neighbourhood call it Dourissa. It is 3,200 ft. above the sea level, the East and West faces are abrupt, but the southern extremity is nearly perpendicular.

From Cape Cross to Walfish Bay the coast is clear, the lead giving sufficient warning when off Farilhao Point, nor is there apparently any danger off the mouth of Swakop River.—H.M.S. *Swallow.*

From Cape Cross to *Omarum* or *Omaruru River*, northward of Farilhao Point, the shore has a fine bold outline, and is quite free from danger. There are vast quantities of driftwood near the mouth of this river, which must have been forced through the sandy table land. There are some other rivers passed in going to the southward. Inland the rugged hills still continue, the southern extremity of the range being marked by a hill of considerable height, shaped exactly like a dome.

In lat. 22° 30′ S., long. 14° 53′ E., a mountain of considerable elevation is seen, *Mount Colquhoun*, or *Quanwas*, 22 miles inland; it is a remarkable hill, 2,000 or 3,000 ft. high, with several peaks on the top, which are sharp and inclined toward the N.E.; and near it is a large body of water, forming a kind of lake, about 40 ft. above the level of the sea; and here the first symptoms of vegetation were met with since leaving the Cape of Good Hope, a few stunted bushes and patches of heather being scattered around.

Swakop River.—At about 15 miles northward of Walvisch Bay, a river was discovered by *L'Espiègle*, in 1824, and named *Somerset River;* this is the *Swakop*, or *Bowel River*, flowing from the eastward. Near its mouth, and extending as far as the eye could reach, are the lofty mountains called the *Quanwas*, or *Clay-trap Mountains* (Mount Colquhoun), reaching from 2,500 to 3,000 ft. above the sea, and forming a conspicuous land-mark on making the coast.

Lieut. Ruxton says, " I examined the Swakop, or Somerset River, which was not visited by Sir J. Alexander, although it was by far the best route he could have followed on his return.

" When it flows, it must be a considerable river, the mouth being 500 yards wide; and it must *once* have flowed with great force, having worn its way through rocks of granite. Its mouth is blocked by a bar of sandy beach, and covered with reeds and flags. A species of hemlock grows in its bed, which, to 20 miles from its mouth, is dry. Water is, however, easily procured a few inches from its surface. Passing the first 20 miles, there are large pools and abundant pasture for many thousand head of cattle, which increase the further you proceed to the eastward.

" It is by the route of the Swakop that the natives proceed to and from the interior, it being perfectly practicable for oxen and waggons. It runs nearly due East. From its source (which, according to the natives, is in a mountainous country) to its mouth, a distance of 300 miles, it passes through a succession of fertile plains, lofty hills, and sandy deserts. At 70 miles from the sea coast the desert changes into plains of fine pasture, which increase in fertility the further you advance, until at the village where Africana resides, the country is rich and fertile, covered with flowers and a luxuriant vegetation. In its course to the sea, it has worn its way through lofty granite rocks, which on its North bank stretch away in a perfect level for many miles.

" Although dry to appearance, the water, most certainly here, as in other rivers on the coast, steals silently along under the sand, and is everywhere procurable at a trifling depth below the surface. The alluvial soil is a black loam, in which are seams of nitrate of potash, in thin leaves, and which also is found in many places as a superficial deposit. At the mouth, rocks extend far out to sea, rendering it impossible that any boat could enter the river, even if there was sufficient water. Neither can a vessel lie with safety nearer than 10 miles from it."—*Nautical Magazine*, vol. xv., 1845, p. 12.

On proceeding southward to Walvisch Bay, the soundings on the coast were found to be dark and muddy sand, the action of which upon metals turns them black, and the effect upon the leads and chain cables makes them appear as if painted. About 4 miles South of Swakop River, *Caution Reef* extends about half or three-quarters of a mile off shore.

WALVISCH BAY.—At 69 miles South from Cape Sierra (or Cape Cross) is the entrance of a convenient harbour, known as *Walvisch*, *Walfisch*, or *Walwich Bay*. This harbour was surveyed by the officers of H.M.S. *Leven*, under Captain Owen, in 1825. Its western side is a sandy peninsula, 4 miles in length, terminating to the North in *Pelican Point*, lat. 22° 53′ 32″ S., long. 14° 27′ 5″ E., where the breadth of the entrance is about 4 miles. All the shore is of sand, and the soundings regular, from 7 to 5, 4, and 3 fathoms, the bottom of the bay being lined with a coast bank. Within the peninsula, on the western side, the water is shoal, and the coast at the bottom of the bay is low and marshy. The interior presents a range of desert sandy mountains. The soundings in the bay are now a little shoaler and not so regular as at the time of Captain Owen's survey, 1826, and the inner part of the bay was found to have shoaled 5 or 6 ft. during the years 1878 and 1879. It is high water, on full and change, at $1^h\ 50^m$; tide rises 6 feet.

Lieut. Bower, H.M.S. *Danae*, surveyed Walvisch Bay in 1878, and the following description is taken from his remarks.

Pelican Point is a low spit averaging 4 to 8 ft. above high water, but in some parts it is only awash at high water. A low hut is situated three-quarters of a mile southward of Pelican Point, on the eastern side of the spit, but is scarcely visible from seaward. A pole beacon, 28 feet high, surmounted by a red ball over a black cask, 6 ft. lower down, stood on the N.W. corner of the sand-spit to serve as a guide to vessels rounding Pelican Point, which otherwise is sometimes difficult to see at a distance of 2 miles.

The *Danae* steered in with the factory bearing South, and anchored as soon as less than 5 fathoms was obtained. The factory is of the same colour as the surrounding land; situated about 60 yards about high water mark on the S.E. side of the bay, and was seen from seaward at a distance of 6 miles.

On the 12th March, 1878, Walvisch Bay with the adjacent territory was taken possession of by Staff Commander R. C. Dyer, H.M.S. *Industry*, in the name of Her Majesty the Queen. The boundaries of the territory are as follows:—On the South by a line from a point on the coast 15 miles South of Pelican Point to Scheppmansdorf; on the East by a line from Scheppmansdorf to the Rooibank, including the plateau, and thence to 10 miles inland from the mouth of Swakop River; on the North by the last 10 miles of the course of the said Swakop River.

Bullocks and sheep can be procured from the interior. Water is brought to the coast from an oasis, from 13 to 18 miles in the interior, in a large cask, on axles, drawn by a horse, after the manner of a garden roller, but that used by the European residents is brought from Table Bay by schooner about once a month. Fresh beef may be obtained at a days' notice, and mullet was caught near the beach North of the factory. The settlement in 1879 consisted of three wooden houses and stores built on the sand close to the beach, and is surrounded by water at high tides.

The ivory trade of the interior lake districts was almost exclusively brought to this, and an important fishery is also established. The *River Kuisip* runs into the southern part of the bay, and has several villages on its banks.

Walvisch Bay has been chiefly described by travellers as a starting point for the interior. Its dreary sands, and total deficiency of water, render it a very undesirable place to remain at. Situated nearly on the tropic, it is in the zone of the most arid desert, consequently there is not the slightest vegetation—all is barren, heated sand, and the effects of the mirage are most extraordinary.

Amongst the authors whose works are most useful is Mr. Andersson, who started from this to Lake 'Ngami, and also describes it in his second work, "The Okavango River," before quoted. Mr. Andersson was for many years a settler in Damara Land, in the interior; but, sad to say, suffered much from the barbarous natives.

Another well known traveller who writes on it, and has most graphically delineated it, is Mr. Thomas Baines, in his pleasant work.

A particular plan of the bay was made in 1786, which represented it as 8 miles broad, and 4 miles deep, taking the depth from two little mussel islets on the coast, which are, perhaps, the *Farilhoens* of the Portuguese chart.

In the month of November, 1825, during hazy weather, every object in the vicinity of Walvisch Bay appeared much distorted by refraction from the dry shining sand, constituting the background. Some ribs of whales which had been fixed in the sand, with one end standing upright, appeared like the masts of ships of considerable burden; while common gulls resembled large sheep, when seen from the distance of a mile. *Pelican Point*, the N.W. extremity of the bay, was thickly covered by the wrecks of whales, with all kinds of fish and sea fowl, in every stage of decay, from which it is evident that strong westerly gales sometimes drive the sea over this natural breakwater. Captain Alexander saw, on the beach, the boxes of several sailors who had been murdered by the natives.

Between Walvisch Bay and Elizabeth Bay, in lat. 26° 55′, many great trees were seen lying high up the beach; and it is a remarkable fact that, as not the slightest vegetation exists on any part of this coast, much less trees of any magnitude, these must have been brought by the strong perennial S.W. wind and current from regions unknown. (Probably from the Indian Ocean.)

Capt. Morrell,[*] in his third voyage, thus describes Walvisch Bay:—"The entrance to the bay is 3 miles wide, running to the South 6 miles, 4½ miles of which is navigable; and the depth of water in going in is from 12 fathoms to 3 fathoms, mud and clay bottom, near the head of the bay.

"The East side of this bay is formed by moderately-elevated sand-hills near the sea-shore, and the West side is formed by a very low sandy peninsula, not more than 15 ft. above the level of the sea at any place, and the water is entirely smooth all over the bay, and, consequently, it is a safe as well as a spacious harbour at any season of the year.

"The interior of the country to the eastward of the bay presents a dreary range of desert sandy mountains and valleys, entirely destitute of soil, or vegetation of any kind, for 20 or 25 miles inland, with the exception of a few valleys that lie to the E.S.E. and S.E. of the head of the bay, in which are a few Hottentot villages, with small herds of cattle and sheep, that feed on such coarse grass and shrubs as they can pick up.

"About 3 miles from the S.E. part of the bay, in a S.E. by E. direction, is a small village, where fresh water may be had from many springs in the valley. This water possesses a peculiar flavour, not unlike sassafras tea, and it is not in the least brackish. The village contains about 250 inhabitants, who often visit the bay for the purpose of fishing. I have frequently had them on board the vessel, and have purchased from them cattle and sheep, which were in fine order. I uniformly found them to be a very friendly, harmless, inoffensive people, but very indolent and filthy, and somewhat given to thieving.

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[*] Among the best known works on this region is Capt. Benjamin Morrell's "Narrative of Four Voyages," published in New York in 1832. This book has the very great merit of having made known to Europe the existence of bird manure, or guano, on Ichaboe. This fact has been of incalculable importance to mankind, in the great increase it has given to agricultural products. But it has also the demerit of being a fiction. It is a very clever compilation; and although the author unquestionably must have visited many of the places he so circumstantially describes, yet, as a *narrative*, it must be placed on the same footing as Robinson Crusoe, and other tales, drawn from the imagination.

"This bay and its vicinity, in the months of August and September, are visited by great numbers of right whales (hence its name), which resort here for the purpose of bringing forth their young. Fish also, of various kinds, and in great abundance, may be caught here with the seine, but it is difficult to haul the seine on shore in any part of the bay, on account of the mud flats. Ships visiting this bay for the purpose of taking whales, in the months before named, should anchor about half a mile within the bay, under the western shore, in 5 fathoms of water, muddy bottom. In this situation they will be enabled to see whales from the mast-head outside the peninsula, and at the same time lie in safety, as northerly winds never blow here more than a royal breeze, and that for a few hours only. The wind blows nearly all the time from the South; and often, in the afternoon, a single-reef breeze. But it is generally calm at night, and in the fore part of the day."[*]

Captain (afterwards Sir) J. E. Alexander reached this place overland from the Cape of Good Hope, in April, 1837. He says:—Walvisch Bay extends along-shore, as it were, for 20 miles. A long spit of sand, terminating in Pelican Point, forms its S.W. shore, and offers an effectual barrier to the roll of the South Atlantic. Vast flocks of pelicans, flamingoes, geese, gulls, &c., frequent this sheltered bay. To the East of the bay there are long ridges of sand, covered here and there with dark bushes; behind these ridges, and in the valleys, brackish water is everywhere to be found by digging. Between the ridges and the sea, where they halted at a pool, there was a plain covered with reeds and grass; whilst the heavy roar of the breakers broke on the ear continually from the West. Morning and evening the atmosphere was obscured by a gray fog, confining the view of the landscape, which, in consequence of the mist and the dimly seen sand-hills, had a peculiarly wild and dreary appearance.[†]

Walvisch Bay was visited in 1852 by H.M.S. *Grecian*, and Mr. Stabb, Master, R.N., gives the following directions:—

"This is a fine, large, smooth-water bay, about 3 miles across and 4 miles deep, but the bottom of the bay is fast filling up with sand, there not being now more than about 3 miles of navigable space inwards from Pelican Point, which should be rounded at the distance of three-quarters of a mile; then haul up South, until a house, on the S.E. shore, is seen nearly on that bearing. The mirage may prevent its being distinguished for some time; but, when seen, steer directly for it, and anchor about a mile to the northward of it, in 4½ fathoms.

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[*] In Captain Morrell's book he gives an account of a journey he took into the interior, nearly 150 miles E.S.E. from Walvisch Bay. In this expedition he describes having seen immense numbers of cattle, "sleek and well favoured," besides three times the number of sheep. He also found copper, lead, and iron ores, and some indications of gold and silver. The natives treated him with kindness and hospitality. Upon his return to America, his views for speculation in these parts were treated with indifference, though it would appear now with great injustice. His journey in November and December, 1828, would have taken him to a portion of country traversed by Captain Alexander, in the expedition above mentioned, the account of which, in a great measure, agrees with that given by Capt. Morrell, although Capt. Alexander met with great privations, and at one time nearly perished. The latter was in this vicinity in March and April, 1837.

[†] Geographical Journal, Vol. viii., 1838, p. 14; "Alexander's Expedition of Discovery," Vol. ii., p. 78; and "Explorations in Tropical South Africa," by Francis Galton, pages 14—21.

"The soundings decrease so gradually, that the same depth of water will be carried for half a mile, particularly on the eastern shore. The depth abreast of Pelican Point is 13 fathoms, and thence across the bay to the S.E. it shoals to 5 fathoms at half a mile from the mainland; but towards the anchorage up the bay the soundings are much more gradual."

The principal points of the coast between Walvisch Bay and Orange River were examined by Commander P. Aldrich, H.M.S. *Sylvia*, 1880, and the information gained is inserted in the ensuing description of the coast.

SANDWICH HARBOUR, or Porto d'Ilheo, lies about 27 miles to the S.S.W. of Pelican Point, and in lat. 23° 20′ S., the intervening coast being low and sandy. *Ponta dos Ilheos*, or *D'Ilheo*, the northern point of a low sandy peninsula, forming the western side of the harbour, is said to be encompassed by shoals, stretching a mile out to sea; and within this point is the harbour, which is small, and has only 3½ fathoms of water.

Sandwich Harbour—the Porto d'Ilheo of the Portuguese—though honoured with so high-sounding a name, might perhaps, with more propriety, be called a lagoon, 6 miles or thereabouts in length, with a depth of water varying from 7 to 2 fathoms. It is formed on the East by high, white, bluff sandhills, and on the West by a low sandy peninsula, nearly level with the sea, with shoal water for more than a mile on the sea-board, and gradually extending to the northward. The water is deeper on this side than over towards the mainland. The entrance of the lagoon, southward of the anchorage, is formed by spits off two low sandy points, and is not more than a quarter of a mile wide.

The hull of an old vessel (used as a store-house), on the beach of the lagoon, forms an additional landmark for this port. There is also a wooden house, a number of tanks, and some barrels on the beach of the harbour, which are seen on passing along the coast. H.M.S. *Sylvia* anchored in Port d'Ilheo in 4½ fathoms water, with d'Ilheo Point bearing N. by W. ¾ W., distant 5 cables.

In H.M.S. *Sylvia*, in 1880, the water was observed to be very light in colour in the vicinity of Port d'Ilheo, and for a few miles southward of it. This discoloured water extended 2 to 3 miles from the shore, and the line of demarcation was clear and distinct between it and the blue water seaward, the depth at about a quarter of a mile inside this line was 13 to 14 fathoms, sandy bottom.

On the beach at Sandwich Harbour, about 2 miles S.S.E. of the entrance, there is a copious fresh spring, yielding most excellent water by digging. Pasturage for cattle may also be had in the neighbourhood. Yet despite these advantages, it is deprived of the importance it would otherwise have by the immense hillocks of soft yielding sand, which cut off its communication with the interior.

Sandwich Harbour abounds so much in fish, that some years ago a Cape merchant established a fishery here, which was and is conducted with considerable success. The fish taken, being salted and dried, are exported to the Mauritius, where they always command a ready sale, not unfrequently fetching the high price of £30 to £35, nay, they have even realised £38 per ton, that is, for one kind of fish called "snook." Other kinds scarcely fetch more than one-half of this high price.—*Mr. Andersson.*

Capt. Morrell says:—On Tuesday, the 18th of November, 1828, we arrived at the mouth of what is called Sandwich Harbour, said to have 3 fathoms of water in its channel of entrance. Although we found only 11 ft. at high water in this channel, I have no doubt that there was a time, some years back, when its depth was full 3 fathoms, and that it has been filled up by drifts of sand, the movements of which along this coast forcibly reminded me of the snow-drifts of my native country; every fresh southerly wind forming new sand-hills, exactly as new snow-banks are formed at home by a fine, clear, cold North-wester.

From Sandwich Harbour the coast trends away to the S.S.W. to an indentation in lat. 24° S., called *Conception Bay*, and thence continues for 32 miles in the direction of Hollam's Bird Islet. It appears to be bold-to, and safe to approach. H.M.S. *Danae*, May, 1878, in lat. 24° 17′ S., long. 14° 8′ E., about 90 miles southward of Walvisch Bay, obtained soundings in 80 fathoms, dark sand and shells, the water discoloured. This discoloured water appeared to extend about 15 or 20 miles off shore, between Cape Cross and Hollam's Bird Islet.

HOLLAM'S BIRD ISLET,—About 77 miles southward of d'Ilheo Point, and at 9 miles from shore, is *Bird Islet*, or *Hollam's Bird Isle*, in about lat. 24° 37′ 24″ S., long. 14° 32′ 20″ E. This little island is not more than three-quarters of a mile in circumference, and about 40 ft. high. A reef of rocks runs off from it for about 5 miles in a S.W. direction, on which the sea breaks at times very heavily. A vast number of right whales frequent this reef in the months of July and August; and a ship may lie at anchor on the North side of the island, in 10 fathoms water, all the whaling season, in perfect safety, if she has chain cables. This island is resorted to by seals, gannets, and penguins; and Capt. Morrell said that he took here the skins of 1,400 fur seals at one time, although the landing was very bad. The passage between the island and the continent is about 9 miles in width, free from hidden dangers, with a depth of water from 20 to 10 fathoms near the reef fringing the main land. The island is visited during the guano season, April to August, but landing is very difficult, being effected by means of the sheers, erected for shipping the guano.

It is probable that Bird Islet is the effect of some mighty convulsion of nature, which has piled together, in an irregular form, loose blocks of stone, basalt, lava, and other volcanic productions. The waters around its shores, however, abound with many kinds of excellent scale fish, which may be caught with hook and line in great quantities. A few turtle, also, may be found on a small sandy beach on the East side of the island.

A sounding of 8 fathoms was obtained by H.M.S. *Sylvia* at about a mile North of this islet, and the water in this direction appears not so deep as to the eastward; as the locality has not been examined, attention is called to this fact. So far as was observed, the bottom was even and sandy.

Alligator Rocks ?—According to the observations made by Capt. Wood, of H.M.S. *Garland*, in 1798, in lat. 24° 38′, a reef, called by him *Alligator Rocks*, lies 48 miles from the shore, with breakers to the S.W., for 6 miles at least. This must have been Hollam's Bird Islet.

The coast abreast of Hollam's Bird Islet trends about S. by W. for 23 miles to a slightly projecting point, in about lat. 24° 58′ S.; it is lower than the coast to the southward, and difficult to distinguish on account of the heavy surf and spray. When from 2½ to 5 miles off shore a small flat-topped rock is seen close to the coast to the southward of the point, and at 3 miles farther North, some remarkable white patches are seen, which are very conspicuous with the afternoon sun. These patches are quite white, coming down to a point towards the base of the hills, and spreading out above in a fan shape.

Hence to the southward the sandy coast forms a slight curve inward for about 12 miles to a sharp double-peaked hill, called *Sylvia Hill*, standing close over a rounded cliffy point. It is not so conspicuous from the northward as from the southward. At about 13 miles southward of Sylvia Hill are some high and rugged sand cliffs, known as *Easter Cliffs*, the intervening coast line being sandy and forming two slight indentations, behind which rises a monotonous range of hills. These cliffs extend for about 3 miles, and breakers extend off the coast immediately North of them for some distance from the shore, although no projecting point could be distinguished. The coast hereabout should not be approached nearer than 2½ miles, the soundings at this distance from the shore being 15 and 16 fathoms, even bottom.

From Easter Cliffs a sandy coast extends 4 miles to a small patch of rock at the North point of a bay about 2½ miles deep and 8 miles across, with several small sand cliffs or drifts on the beach about 2 miles southward of the point. The South point, which is cliffy and high for about 3 miles, is conspicuous, and forms the northern point of Spencer Bay. The coast between Easter Cliffs and Spencer Bay is lined with a high and level range of sand-hills.

SPENCER BAY, in lat. 25° 42′ 30″ S., about 66 miles S. by W. from Hollam's Bird Islet, may be known by Mercury Island, which lies off the middle of it, and Dolphin Head, its southern point. When seen from a few miles northward of Spencer Bay, *Dolphin Head* appears like an island, and bears a slight resemblance to the rock of Gibraltar, Mercury Island appearing as a sharp-edged white rock.

Mercury Island is a black, rugged rock, of an oblong shape, about 1½ mile in circumference, and rising about 130 ft. above the level of the sea, which at times beats against its sides with indescribable fury. In the face of this rock there is an immense cavern, into which the sea rushes through several apertures, or rents, causing thereby an awful noise and commotion. A detached rock, 50 ft. high, lies off its northern end, and a rocky shoal extends 2 cables off its South end. The sea breaks heavily in bad weather about half a mile N.E. of the island, but the water is moderately deep.

This rock is the favourite resort of the penguin, the gannet, and other birds; fur seals also haunt it in abundance. Whales frequent this bay in considerable numbers, in the months of July and August. The shores and surface of the island present many specimens of volcanic productions, so do also those of the continent in this vicinity, extending some distance into the country.

Considerable quantities of guano have been brought away from Mercury Island, and merchants at the Cape still continue to draw from it small supplies, though the manure is said to be of a very indifferent quality. About 350 to 450 tons is annually shipped from Spencer Bay. It is impossible to conceive anything more wild and dreary than this isolated spot, and nothing but the hope of great profits could ever induce men to imprison themselves in so wretched a dungeon; a sentence of transportation could not certainly be more severe and more penal than the banishment and confinement the guano gatherers impose upon themselves. Landing may be effected during the guano season, April to August, just South of the narrow gully between the island and the rock off its North end.

Mercury Island is about a mile N.E. by N. from the S.W. point of Spencer Bay, and 2½ miles S.W. ½ W. from the N.E. point, a very high sandy hill. Both passages are easy and free from dangers; and the best anchorage is on the East side of the island, about 1½ or 2 cables from its shores, in 5 or 6 fathoms of water, sand and clay bottom; but if rollers set in, this position may be unsafe. It is not advisable for ships to anchor on the South side of the bay, as a heavy westerly swell heaves into it on the full and change of the moon; but let them anchor close under the island, and they will be perfectly safe, and usually in smooth water. H.M.S. *Sylvia*, 1880, anchored in 6 fathoms, with Dolphin Head bearing S.W. ⅞ S., and the South extreme of Mercury Island W. by N. ⅜ N.

Dolphin Head, the South point of Spencer Bay, presents several high peaked rocks, and rises nearly 600 ft. perpendicular at the water's edge.

Captain Morrell says, "I can also refute another erroneous statement respecting this coast. It is said that there is a dangerous shoal lying between 3 and 4 leagues to the West of Angra Pequena, in lat. 26° 35′ S., but I can assert, with the greatest degree of confidence, that there is but one shoal on any part of this coast, South of Spencer Bay, that lies more than 4 miles from the main land; and this one (now known as Staple Reef) lies N.N.W. from Angra Pequena, or Santa Cruz, about 15 miles."

From Dolphin Head a rugged cliff extends for 2½ miles to the North point of a bay, 2 miles across, having shores of cliff and sand, and at its northern extreme stands a rocky pyramid, prominent when seen from the southward, and, when seen from the westward, appearing as a flat-topped ledge. Its southern extreme is a conspicuous cliffy headland, and from hence the shore is sandy for 9 miles to the southward, or as far as *Saddle Hill*, which has a conspicuous sharp peak, in lat. 25° 56′ S. Hence to Hottentot Bay, 10 miles to the southward, the coast is a sandy beach, rising at a short distance inland to a level range of sand-hills. This beach is continuous except in two places, where there are small sandy cliffs close to the water.

Hottentot Bay, 23 miles S. by W. from Dolphin Head, is about 3 miles wide, and about 2 miles in depth. *Hottentot Point*, its S.W. point, is low, and is said to be prolonged by a reef for nearly a mile, on which the sea usually breaks. The bay affords good anchorage, well sheltered from the S.W. swell, in 6 to 4 fathoms, gradually shallowing towards the shores; the bottom is a mixture of clay and sand, and forms, in consequence, most excellent holding ground. In the summer time a vessel may be hove down here with ease. There is abundance of fish, but no fresh water. Whales and seals frequent the bay, or did so formerly. It has been called *Sims' Bay*, and may be *Rae's Bay*.

The point of land protecting the bay is partly rocky and cliffy, but near the main land the neck of the peninsula is low and sandy, so that Ichaboe Island may be seen over it from the masthead of a small vessel at anchor. On the South side of the neck is a small rocky islet, connected with the shore by *Gallovidia Reef*, low and rocky, where numerous birds resort, and seals also may sometimes be caught. Some natives occasionally visit the bay for fishing, and seem civil and harmless.

H.M.S. *Sylvia* anchored in 4 fathoms, with the North extreme of Hottentot Point bearing N.W. by W., distant nearly 1 mile. No signs of natives were observed here.

From Hottentot Point the coast is sandy for about 8 miles, curving southward to a rocky point just N.N.E. of Danger Point, and behind which is a small bay.

ICHABOE ISLAND, in lat. 26° 17′ S., long. 14° 57′ 25″ E., and about 30 ft. high, was the scene of a very remarkable commerce in the years 1843 and 1844. It was originally covered with an immense deposit of guano, a production of sea birds and seals. During the years stated it was the busiest place in the world; crowds of vessels coming hither to carry away this valuable deposit, which at last entirely disappeared about February, 1845. It is, however, still visited annually for its guano, which is collected in considerable quantities during the season. On page 778 we have given a few remarks as to the physical conditions under which this mass of fertilising matter had accumulated.

Ichaboe Island is about 3 cables long N.N.E. and S.S.W., and three-quarters of a mile from the shore. There are several outlying rocks off it, all above water, except the reef stretching about a cable off the North point.

The best anchorage is on the eastern side of the island, with it bearing W. by N. 2½ cables distant, and N.N.W. 2½ to 7½ cables distant. This can hardly be termed a secure anchorage, though it is seldom that accidents occur if due precautions are observed. The chief safeguard is to have ground tackle suitable to the ship's tonnage, for as long as they do not drag their anchors, vessels are well sheltered by Ichaboe Island from the heavy swell that sets in, but when that island bears southward of West, the rollers are often dangerously heavy. The holding ground is not very good, being composed of sandy patches among rocks. H.M.S. *Sylvia* anchored off Ichaboe Island in 7 fathoms, with Douglas Point bearing S. ½ E., Rocky Point S. by W. ½ W., and the South extreme of Ichaboe Island W. by N.

At 7½ cables N.E. by E. ½ E. from the North point of the island is a rocky spot of only 4 ft. water; it is 2½ cables off shore, and outside is a bank of 2½ fathoms. The northern entrance between this bank and the island is said to break in heavy weather for several miles, although 5½ to 10 fathoms in depth. At 1½ mile S.S.E. from the island is *Douglas Bay*, a small bay on the main land, where there is difficult landing on a sandy beach, on which is a Hottentot village; from this there is a pathway to a village of about fifty inhabitants, 8 miles distant, over a bad road through the desert. This is the nearest place where water can be procured, and here it is brackish and scarce. Another landing place in the finest weather is at Wreck Point, abreast the island. The water used by the Europeans is brought from Table Bay. On the coast, 1½ mile

N.E. by E. ½ E. from the island, is a range of black cliffs about 300 ft. high terminating in *Danger Point*. The strata of rock on shore dip to the northward, so probably anchors will hold best with South winds.

Throughout the whole neighbourhood the stream almost constantly runs t the *northward*, about 1 mile per hour. At the anchorage nearest to the island the first of the ebb runs faintly to the southward; this probably is an eddy The prevailing wind is from the S.S.W., or S.W. by S., consequently the bes passage to the anchorage is through the *South Channel* (not North, as recommended by Captain Morrell), having the advantage of wind, current, an clearer ground. Northerly winds, accompanied by fog, are frequently experienced, but N.W. gales are of rare occurrence.

The breeze is frequently strong from the S.W.; no rain, but dense fogs an heavy dews, occasionally thunder and lightning. The dryness of the air is s great as to produce disagreeable effects on the face, mouth, and eyes.

During November, December, and January, the thermometer generally range from 55° to 65° at 1ʰ p.m., occasionally at 50° or 70°, on board the ship in th shade. Water generally 50° to 52°, sometimes 65°. Barometer ranged durin the above months, 30·10 to 29·25.

The rollers are similar to those at St. Helena, &c., as described on a forme page. When they are heavy, they break above a mile from the island, bu usually about half a mile from it. The rollers come in without giving previou warning, and it is no unusual occurrence for both entrances to break rig across, leaving comparatively smooth water at the anchorage.

Boat landing is sometimes difficult and even dangerous, particularly aft heavy gales outside, and about the times of new and full moon. On suc occasions a surf recoils from the island, and breaks from 30 to 40 yards fro its eastern shore; but outside of that break, and where a vessel must lie, th water is quite smooth. The best place to land is on the N.E. extreme of th island.

At Ichaboe Island it is high water, on full and change, at 1ʰ; springs ri 6 ft., neaps 3 to 4 ft.

Ships bound for *Ichaboe* should make the high land of Angra Pequena, an taking advantage of the wind and current, sail along shore, keeping a modera distance from the land, perhaps about 3 or 4 miles, and carefully avoidin Staple Reef and Marshall Rocks, 6 or 7 miles southward of Ichaboe.

Ichaboe, Plum Pudding, Pomona, Possession, Halifax, and Mercury Islan are visited every year for guano, which is collected in considerable quantitie The season begins in April, and continues until August and September, wh some of the men who have been employed in collecting guano go in search seals which frequent the rocks off this coast, while others return to the Cap Communication is maintained between these islands and the Cape by schoone which sail at stated intervals. In 1880 the total produce of these islands w said to exceed 5,000 tons of guano.

The shore between Ichaboe and Angra Pequena has several distinguishi marks, some off-lying rocks known as *Seventy-Four* and *Eighty-Four Roc* making breaks in the otherwise monotonous coast. In lat. 26° 28′ S. is rounded rocky point, on which are two beacons, and a little farther Nor on the beach, is a conspicuous cone of sand, which shows very clearly in t afternoon.

About 2 miles southward of Douglas Bay commences a group of rocks and reefs, known as *Marshall* and *Staple Rocks*, on which the sea breaks heavily, and with a dangerous passage between them and the coast. *Staple Rock*, low and black, lies three-quarters of a mile from the shore, at about 7 miles South of the entrance to Ichaboe anchorage. *Staple Reef*, extending N.W. from Staple Rock, consists of rocks and sand-banks, with patches of comparatively deep water between them. Although the above dangers may be passed at a distance of less than a mile, yet the rollers extend much farther than that, and the water is often seen to break in 10 and even 12 fathoms.

ANGRA PEQUENA[*] (*Small Bay*), a break of the land, forming several little harbours, is 22 miles southward of Ichaboe Island. Its outer point on the S.W., *Diaz*, or *Pedestal Point*, was still distinguished in 1825 by the pedestal of a marble cross, erected by Bartholomew Diaz, in 1486, but it has now disappeared. Pedestal Point is in lat. 26° 37′ 52″, long. 15° 7′ 5″ E.

At 3 miles E. by S. ¾ S. of Pedestal Point is *Angra Point*, off which is a cluster of rocks, extending more than half a mile N.N.E. from the point, with a channel of 4½ fathoms between them and the point; but it is safest to go round to the northward of them, giving them a berth of half a mile. The coast between them forms a cove, called *Shearwater Bay*, open to the North and N.W., but in the middle of which there is anchorage in 6 and 7 fathoms, fine sand, and sheltered from S.E., South, and S.W. winds. H.M.S. *Sylvia* anchored in this bay in 5 fathoms, with the North extreme of Penguin Island open of Angra Point, bearing E. ½ S., and Diaz Point N.W. ¾ N.

Within Angra Point, on the East, is an inlet, extending 5 miles to the S.S.W., and the entrance of which is 1½ mile broad between Angra Point and Shark Isle. In this inlet, off Shark Isle, there is good anchorage in 4 and 3½ fathoms, or a mile higher up in 2½ fathoms, bottom of sand. At the head of the inlet there is good landing.

The N.E. point of Angra Pequena is 6¾ miles E. by N. ½ N. (*N.E.*) from Pedestal Point. From this point three islands extend in a true South direction; the southernmost of which, *Shark Island*, is 4½ miles from the point, and forms the N.E. side of the inlet above mentioned; there is no channel to the southward of it to the harbour on the East side. From its North point a reef extends for one-third of a mile; and from the South point of *Penguin Island*, which is low and rocky, there is a similar reef projecting; the channel between them has a depth of 6 fathoms in the middle, and is nearly half a mile wide. The northern end of Penguin Island is apparently covered with guano, or whitish yellow coloured sand; in the middle of the island, also, there is another patch of similar appearance. One-fourth of a mile East from the North point of Penguin Island is *Tiger Rock*, which renders the anchorage in this part unsafe, as the rocks around do not always show themselves.

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[*] Lieutenant Ruxton, on an overland journey he made in 1845 from Ichaboe to Angra Pequena, found on the coast between these places the trunk of a red cedar lying on the beach. The origin of this drift timber affords room for speculation, as there is not a tree growing within 300 or 400 miles North or South of the spot. It may have been brought down by the Orange River and then drifted northward, or perhaps more probably brought by the Southern Connecting Current from the coast of South America.—See *Naut. Mag.*, January, 1846, p. 6.

Between the main land and Penguin and Shark Island is *Robert Harbour*, with good and sheltered anchorage, in 5 fathoms, clay bottom. It may be entered and left with perfect safety, either from the North or South end of Penguin Island, but the southern passage is to be recommended. The best situation to anchor in is eastward of the South end of Penguin Island, midway between it and the shore.

Seal Island lies about a mile northward of Penguin Island, and, like the other two, is about a mile in length. It is higher than Penguin Island, and is round-topped, with the northern extremity sloping more gradually to the sea than the southern. There is a spar beacon on its summit, and the North part of the island has the same whitish yellow colour as Penguin Island. The bay within, or to the westward of the South end of this island, is about 1½ mile broad, with depths of 2¾ to 5 fathoms; while that to the southward, or Robert Harbour, is about a mile. The channel between Seal and Penguin Islands is about half a mile wide between the shoals extending from each of them. Eastward of the North end of Seal Island is another small bay, the entrance, between Seal Island and N.E. Point, being narrowed to half a mile by a rocky shoal running out half a mile from the latter.

The coloured patches on Penguin and Seal Islands are conspicuous in the afternoon, and could not fail in attracting the notice of a stranger, even when as far as 8 miles to the northward. They are seen some time before either Diaz Point or Halifax Island can be made out.

The aspect of Angra Pequena is as dreary and melancholy as it is possible to conceive. Scarcely a vestige of vegetation is to be found within some miles of the place; dry sand and rocks, time-worn and buffeted by centuries of bad weather, constitute the whole landscape. Moreover, there is no fresh water to be had here. To remedy this deficiency an attempt was made, some time ago, to sink a well in one of the granite rocks; but the task proved a failure. Yet, despite these disadvantages, Angra has long been resorted to by traders, who have a depôt here, which is occasionally visited by the natives of the interior, who bring with them for sale, cattle, fur skins, ostrich feathers, &c. For these goods they receive in exchange clothing, tobacco, guns, ammunition, &c., but more especially spirits, to which the Namaquas, who having once tasted the fiery liquid, are fearfully addicted; they will sacrifice their last ox or sheep to procure intoxicating drinks. Indeed, this portion of the country, which never could boast of much wealth, has been nearly ruined by brandy.

The sailors of the different whaling, sealing, and guano ships that have touched at Angra for fresh provisions, have frequently, it is affirmed, taken advantage of this failing of the natives to cheat them of their property in the most scandalous manner.

Capt. Morrell observes :—"The Bay of Angra Pequena affords an immense quantity of excellent fish, of many different kinds; and about 10 miles to the North there are many fine springs of fresh water about 1 mile from the sea."

November 21st, 1825.—A heavy S.E. gale set in, before which the sloop *Barracouta* was carried with great velocity. In the afternoon the remains of the cross erected by Diaz, on the southern extremity of Angra Pequena, was seen. It had been wilfully cast down within the last forty years. The gale continued when the *Barracouta* left Angra Pequena, and by the next morning she had run to the northward upwards of 130 miles, having in that distance passed the limit of the rocky and sterile country, and come abreast of the desert. This rises into lofty hills of light-coloured sands, having here and there a small rocky patch, with a few tufts of parched grass, breaking on the dull, monotonous view. In some parts of this desert the sand-hills rise to a great height, without a spot of verdure to relieve the eye.

Angra Pequena was surveyed in the boats. The surrounding country is one continued sand, without a shrub so far as the eye can see. The interior bears the same aspect, and no natives were seen.

At Angra Pequena, in the forenoon, there are light northerly winds; in the afternoon, fresh S.W. sea breezes. It is high water, on full and change, at $2^h\ 30^m$; springs rise 8 ft.

Guano, or *Halifax Island* (*Bross*, or *Sirène Island*), a black rock, half a mile in length, North and South, with a reef extending 2½ cables off its North end, lies 1½ mile S.W. by W. of Pedestal Point, and will serve as a good mark for Angra Pequena. On one of its peaks, called the Grand Vigia by the whalers, was a white mark called the Cross; there is also a house and flagstaff on the island. Between the point and the island is a small sandy bay, sheltered from the southward, called *Guano*, or *Shiermont's Bay*. The South end of Guano Island is joined to the mainland by shallow water. Guano is procured here. A sandy beach succeeds to the southward for 4½ miles to the western point of *Big Bay*, which is rocky and has no shelter. At 3 miles farther on, the coast still rocky, is a projecting point, called *Ludovic Point*.

Ludovic, or *Long Island*, of volcanic formation, is half a mile southward of the point. It is low, and nearly 1½ mile long, and has one or two small rocky islets above water lying off the South extreme, which serve to protect the anchorage within. It is almost divided into three parts, the sea breaking over it in two places, but there is no channel available even for boats. The channel between the North extreme of the island and the main is about half a mile wide; the southern extreme is about three-quarters of a mile from the main land, but the navigable channel is narrowed by off-lying islets. To reach the anchorage, pass to the North of the island. Abreast the island, on the main land, is a conspicuous cairn, and on the northern shore of the harbour is a house, used during the sealing season.

A little to the North of the island is a remarkable sugar-loaf mountain, called *Monte Deserto*, which serves as a good landmark for Elizabeth Bay.—*Capt. Saisset.*

Atlas Bay, 1 mile southward of Long Island, and *Adventure Bay*, 1½ mile farther, are both very small, with no shelter. A rocky shore succeeds for 3 miles S. by W. to *Elizabeth Point*, which is low and rocky, with a dangerous reef and heavy breakers extending 1½ mile southward of it.

ELIZABETH BAY.— At 15 miles to the southward of Angra Pequena is Elizabeth Bay, a slight indentation in the main land, about 2 miles across, with a beach of sand and rock, but chiefly sand, sheltered by Possession Island, which lies to the West of it. Vessels, when entering the anchorage inside Possession Island from the northward, stand in on a wind for the centre of this beach, and when well over towards it, tack and stand for the anchorage.

Possession Island is 3¼ miles in length, N. by E. and S. by W., and nearly a mile in width, and has several rocks, above and under water, at its North end, with sunken rocks at its South end, and off its East side are some detached shoal patches. The space between it and the shore is from 2 to 3 miles in breadth, and has in mid-channel from 11 to 7 fathoms. Within the middle of the island a vessel may anchor in from 7 to 4 fathoms, sandy bottom and smooth water, but is exposed both to northerly and southerly winds. On the East side is a landing-place for boats, in front of the anchorage. Here it is high water, on full and change, at 3^h; springs rise about 6 ft. The position of the South point of Possession Island, as given by Capt. Owen, is lat. 26° 58′ 30″ S., long. 15° 12′ 30″ E.

Possession Island, when seen from a short distance to the southward, appears as a cluster of islets with shoal water between them, for there are three or four peaks joined by low land, against which the sea breaks with violence. A spar beacon stands on the southernmost hill on the island, and is readily made out. At this place, in the months of August, September, and October, any quantity of penguins' eggs may be collected, and fish of an excellent quality may be caught in great abundance about the shores.

On the surface of this island Capt. Morrell saw the effects of a pestilence or plague. The whole island was literally covered with the carcases of fur-seals, with their skins still on them. They appeared to have been dead about five years, and it was evident that they had all met their fate about the same period. Probably they were overwhelmed and suffocated by a sand-spout bursting upon them, accompanied by the sultry, stifling sand-winds which created it.

There are a few sunken rocks lying off the South point of the island about three-quarters of a mile, on which the sea generally breaks. There is also a reef running off the N.E. end of the island about 1½ mile, on which the breakers are frequently very heavy. These reefs both incline to the eastward, which promotes the smoothness of the water in the harbour. Between the island and the continent, or rather between the extreme points of the reefs and the main land, the channel is 3 miles wide, with from 15 to 10 fathoms water, sandy bottom, and free from danger. Ships intending to anchor at this island while the South winds are fresh, should approach the anchorage from the South, and leave it by the opposite passage.—*Captain Morrell.*

A dangerous rock, with 9 ft. water over it, lies about E.N.E. distant three-quarters of a mile from the beacon, and foul ground is reported to exist some distance to the N.N.E. of this rock. A dangerous rock of 2 fathoms, called by its discoverer, Captain Michel, *Heliopolis Rock*, lies in the North part of the anchorage, 2½ miles N.E. by N. ½ N. of the S.E. end of Possession Island. *Broke Rocks*, two rocky heads, with 12 ft. water, are upwards of a mile within the N.E. point of Possession Island, and equi-distant from Heliopolis Rock, which lies half a mile nearer the island.

Point Bol, the southern limit of Elizabeth Bay, is rocky, and about a mile off it is an islet of the same name. Eastward of Bol Islet is a small bay called *Prince of Wales Bay*, used by small vessels, and here some copper ore is shipped. Boyd's Island, a low, dark, volcanic formation a quarter of a mile in circuit, is about a mile southward of Bol Island, to which it is said to be joined by reefs. *Plum Pudding Island* is 3¾ miles from Boyd's Island, the coast between them being bestrewed with rocks, which are visible from the offing. Plum Pudding Island is in the form of a round cap, red at the top. Boyd's and Plum Pudding Islands are called *Albatross Rocks* by Capt. Owen. Care must be exercised when in this vicinity, as this coast has not been carefully examined.

From Elizabeth Bay to Cape Voltas, or Winding Cape, the coast trends South and S. by E. ½ E., 128 miles. *Angras Juntas*, or Namaquas Bays, lie about halfway between. Between Elizabeth Bay and Angras Juntas the coast is rocky, and, with that southward of it, without the least sign of water or vegetation. The only animals seen were wolves, although the tracks of many others were found, particularly of the lion and buffalo. On all parts of the coast, near the anchorages, were found the bones of whales in great abundance. Several rocks and islets lie off the shore, and ships may anchor in 15 to 20 fathoms, sand, at 5 miles from the coast.

Whale Bay, in lat. 27° 22½′ S., is merely an indentation of the coast, without any shelter. Landing is easy in the South part of the bay, and cattle may be got from a Hottentot village, 12 miles inland, the inhabitants of which frequently come down to the coast.—*Captain Livingston.*

Angras Juntas.—Capt. Morrell says:—At Angras Juntas there is a small bend in the land, running in to the eastward about a mile, the width of its mouth being about a mile. Here ships may find tolerable shelter with southerly winds. Captain Messum, who visited the spot at a much later period, says that the cove has since filled up. *Roast Beef Islets*, in about lat. 28° S., are low and rocky, and frequented by coasters for guano.

Northward of the Orange River, which is in lat. 28° 38′ S., the coast is an undulating sandy plateau, upon which there are no conspicuous objects until, at a distance of about 25 miles North of the river's mouth, the land in the vicinity of the shore somewhat lowers, and when it bears about East, a flat-topped range is seen above it inland, and a much higher range, the summit of which is well defined, shows out at a considerable distance beyond to the north-eastward. This dip in the land on the coast has the appearance of a river bed; the southern rise, when it bears southward of East, appears to terminate in a step, with a patch of sand below it, which tends to make it more conspicuous when seen in the afternoon. There are some sand-hills inland of this dip, their flat tops apparently consisting of bare sand, which shows clearly in the afternoon.

Northward of this the coast resumes its monotonous appearance for a few miles, when a break is seen to the N.N.E., where the land, after maintaining nearly the same height for some distance, is lower, and slopes with three slight steps to an apparent point. These steps on a nearer approach are seen to be sand-hills, some of which are flat-topped, while others rise to sharp peaks, more conspicuous when seen from the southward than from the northward.

Northward of the Roast Beef Islets the coast is cliffy, and indented with numerous bays, with several rocks off it, some bearing the most fantastic shapes. In particular, there is one granitic rock, in lat. 27° 18′, which seems originally to have been of some height and extent; but the sea, or some other cause, has carried away the whole of its centre, excepting a surface of about 20 ft. deep, which rests on the two extremities, leaving between them a vast archway or natural bridge, upwards of 100 ft. in height, and apparently capable of allowing a ship to sail under without lowering a mast.

A very heavy surf was seen on the Bar of Orange River and along shore. Although a vast space of water was seen over the foaming bank, yet no entrance for a boat could be found.

ORANGE, or GARIEP RIVER, is one of the largest rivers of Southern Africa, and forms the northern boundary of Cape Colony; it rises on the eastern side of the continent, and its mouth is in lat. 28° 38½′ S., long. 16° 27½′ E. Captain Sir James Edward Alexander visited the mouth of it in his expedition. He says that the land is flat about its mouth, and on the North side is good pasture. The breadth of the entrance, at the beginning of November, was about 170 yards, whilst inside was a lake about 4 miles across, and abounding in wild fowl. The air was darkened, and filled with the cries of wild geese and ducks, flamingoes, pelicans, gulls, &c. Here is most excellent shooting ground for the sportsman, and "harder" and "springer" fish abound for the seine.

"I saw no rocks at the mouth of the Orange; there is probably a shoal of sand outside; but, with care, it seems that the mouth of the river could be entered by a schooner. Copper ore, of extraordinary richness, is found near the South bank, about 4 days' journey from the mouth, and iron ore is also abundant in its neighbourhood. Honey is found in very large quantities about the Orange River, particularly in December and January. The climate is very healthy for Europeans."

The fact that the Orange River is (perhaps) hopelessly barred, is a very serious drawback to the vast resources which exist in the country it drains; were it otherwise, it would be the most important river of South Africa. Extensive and most rich copper mines have been discovered near its banks, and gold probably exists in the mountains. Some of these mines are being worked, and the produce carried by a railway from the mines to Port Nolloth, presently described, a distance of 90 miles. Besides this, the newly discovered diamond fields have created quite a colony about its upper waters.

Its entrance has even more than once, within the memory of the present generation, been closed up entirely, whereby a sudden inundation overflooding the country has given it the appearance of a vast lake. Near its embouchure this river expands to a breadth of about 4 miles, and is dotted over with numerous reedy isles.

Of the Orange River that portion alone is navigable which very nearly adjoins the sea, and then only for small craft, and at certain periods of the year; in the dry season, shoals and sand-banks are everywhere visible in its channel. Even higher up, the navigation is frequently impeded by rapids and waterfalls, some of which are very grand and beautiful.

Navigating-Lieutenant Archdeacon, in 1870, found the river entrance obstructed by an extensive sand-bank, on a rocky base, said to extend for 6 miles from shore, and the river for several miles within was similarly blocked up. Landing is impracticable at all seasons of the year.

The coast of the Cape Colony from hence to the southward was surveyed by Navigating-Lieutenant W. E. Archdeacon, R.N., in 1869—70.

The coast between Orange River and Voltas Bay is very low, sandy, barren, and desolate. It retains this appearance for some distance from the shore; but after running back 6 or 8 miles, it begins to swell into hills; and still farther back it rises into lofty mountains, which stand on each side of the river, on the banks of which are a few Namaqua villages. The wealth of the inhabitants consists of herds of cattle and flocks of sheep.

Alexander Bay, just to the southward of the river entrance, is small and only occasionally used by coasters.

VII.—THE CAPE COLONY.

The Cape of Good Hope was discovered by Bartholomew Diaz, in 1487, who named it *Cabo Tormentoso*, or the Stormy Cape, on account of the boisterous weather which he experienced near the coast, which prevented him from making the land. But John II., King of Portugal, entertaining no doubt of his having found the long-desired route to India, gave it a name of better omen, viz., "The Cape of Good Hope." Accordingly, his successor, Emmanuel, despatched Vasco de Gama, who, in 1497, first proceeded round it to India.

After the discovery of the Cape, the Portuguese fleets continued for several years to resort to various bays of the present colony for the purposes of refreshment. In 1614, the English attempted a settlement with a few convicts at Robben Island, in Table Bay, but it was soon broken up. In 1620, the English, finding a Dutch fleet in Table Bay, took formal possession of the place. In 1648, Van Riebeck, a surgeon, touched here on his homeward passage; he induced the Dutch East India Company to form a settlement here, as a rendezvous for their vessels. Accordingly he sailed as the founder of a new colony, where he arrived on April 6th, 1652. After a peaceable possession of the colony by the Dutch for 143 years, possession was taken of it by the English on the 16th of November, 1795. It was again taken on January 10th, 1806, and was finally ceded to the English in 1815.

The Cape Colony contains an area of about 250,000 square miles, and, according to the census of 1875, the population consisted of 236,783 Europeans or whites; 98,561 Hottentots; Kaffirs and others, 385,640; a total of 720,984. In 1881 it was estimated to contain about 1,250,000 inhabitants, including those of the lately annexed provinces of Griqualand, &c., and the portions of Transkei and Tembuland not yet formally annexed.

The trade of the colony has been much increased by the discovery of gold and diamonds near the Vaal River, and the docks, railways, and lines of telegraph now in use, and others under construction, testify to the increasing importance of the Cape Colony. Its chief exports are wool, copper ore, hides, horns, ivory, diamonds, and ostrich feathers. The exports of wool have risen with astonishing rapidity from 113,077 lbs. in 1833 to 48,822,562 lbs. in 1872; 42,467,962 lbs. in 1880. The total value of imports in 1880 was £7,648,863, and of the exports, excluding specie and diamonds, £4,341,017.

The surveys and observations of Admiral Owen, Sir E. Belcher, and in lat times those of Mr. F. Skeard, R.N., with Lieutenants Dayman, Simpso Forsyth, Archdeacon, and Stanton, supply us with a tolerably accurate hydr graphical account of the Cape Colony.

CAPE VOLTAS, in lat. 28° 42′ 30″ S., is 6 miles to the southward Orange or Gariep River. According to Captain Morrell, Cape Voltas is a hig bluff point, projecting into the sea; and there are several rocks lying abo half a mile westward of it, beyond which there are no dangers. About 1 mi northward of the cape there is a small bay, not more than 2 miles in lengt and 1½ mile in width; within which the anchorage is not safe, as the groun is foul, and heavy rollers are continually heaving in from the westward at a seasons of the year. Ships, however, which are in want of fire-wood, may off and on, and obtain any quantity from the head of the bay, where they wi find immense quantities piled up on the beach, which comes down the Orang or Gariep River. This bay is probably the same as Alexander Bay, previousl mentioned.

The land around the cape, and to the South as far as the Koussie River, high on the seaboard, running back into elevated mountains.

It has been said that there is no fresh water to be had on this coast Nort of Cape Voltas, but this is an error, as any quantity can be had in Voltas B in the rainy season, without the trouble of searching for it under ground. B by digging, fresh water may be had at all seasons of the year, at a short di tance from the head of the bay, where the landing is very safe and convenien sheltered by two small islands lying close to the beach, inside of which th water is perfectly smooth.

Cape Voltas is commanded by two high hills, called the *Bramidos Mou tains*, the highest of which is remarkable for the regular and rounded form its summit.

From Cape Voltas the coast trends S. ¾ W., 65 miles, to the *Koussie Rive* where some Hottentots may be found, near the parallel of 30°; this rive however, is not shown on the chart of the survey by Lieut. Archdeacon. Th space between is very hilly, and to the southward appears in high, brok mountains. The coast is lined with reefs and breakers.

About 9 miles southward of Cape Voltas is a rounded point, above whic rise two high hills, known as the *Twins*, off the southern of which a dangero sunken reef runs a considerable distance off shore. Commander Nolloth, H.M. *Frolic*, examined the coast hereabout in 1854; a full description will be foun in the Nautical Magazine, vol. xxiv., 1855.

Peacock Roadstead is an indentation in the coast just northward of th Twins, with regular soundings of 4 to 5 fathoms near the cliffs, deepening 12 and 14 fathoms at a convenient distance for anchorage, where there shelter from the constant ocean swell, and from the S.S.W. wind, which blow during so great a part of the year. *Harrison Cove*, in the southern part Peacock Roadstead, is small with no safe anchorage. *Homewood Harbour*, the foot of the northernmost of the Twins, has a rocky and uneven botto and could only be used by small craft.

From Homewood Harbour the coast trends 7 miles S. by W. to *Wre Point*, at 1½ mile S. ½ E. of which is the outer edge of *Soco Reef*, lying mile off shore. From Wreck Point the distance to the North Point of Po

Nolloth is 25½ miles S. ¼ E., and the coast is lined with breakers all the way, and should have a good berth to avoid sunken dangers.

PORT NOLLOTH, or ROBBE BAY, is a small but very safe harbour for vessels of light draught, and is becoming of considerable importance as a port of shipment for the copper ore obtained from the mines, which are situated about 90 miles from the coast. "Great credit," Mr. Archdeacon remarks, "is due to the Copper-mining Company for the energetic manner in which they are carrying out the works for developing the mineral wealth of this otherwise unproductive tract of country." A steam tramway unites the port with the mines, and vessels may lie alongside the pier, in fine weather, to receive their cargo.

The port is formed by a slight indentation in the coast in lat. 29° 15′ S., long. 16° 52′ E., and a rather remarkable patch of reddish sand, on a range of low hills, about 5 miles inland, and bearing East from the port, may possibly be of assistance in identifying the locality. Port Nolloth was surveyed in 1870 by Navigating-Lieutenant W. E. Archdeacon, R.N.

Port Nolloth affords anchorage for vessels of light draught, on the South side, well sheltered by a reef, partly dry at low water, and by *Robbe Islet.* The entrance is sufficiently wide to allow vessels to enter or leave without difficulty in moderate weather; and there is a very narrow boat passage through the reefs at the South end, which can only be taken in very smooth weather.

The reef projects from the southern point of the bay, and runs to the northward about three-quarters of a mile, keeping nearly parallel to the shore, and a little more than 2½ cables off it. This reef almost meets another which runs to the southward from the North point of the bay; the passage between the extremes of these two reefs is about 1¾ cable wide, but this is nearly filled up by a rocky shoal called the bar, with 11 to 17 ft. over it, and on which in fresh winds the sea breaks heavily; the breakers sometimes extend right across the passage.

The town is built along the low land which lies just above a good sandy beach abreast of Robbe Islet, and is becoming a place of some importance. There is a hospital here; also a patent slip.

The anchorage is inside Robbe Islet, where vessels drawing not more than 8 to 9 ft., which can only enter at high water, may lie in safety, for although the sea may break heavily on the reefs and across the entrance, no heavy sea comes far within the reefs. The best anchorage outside the reefs is nearly a mile off the bar, in about 23 fathoms, sand, with the North beacon bearing E. by N., and the two South beacons in line S.E. ½ S., inside of this the bottom is rocky. This position is a favourable one for boats proceeding in or out of the port, with the prevailing wind.

There are five or six beacons on the shores of the bay, the *North beacon* being about a mile North from the pier at Port Nolloth. Eastward of the bar lies another pair of beacons, E. and F. Beacon E., near the shore, is painted white with a black stripe; beacon F., on the northern side of a hill, was surmounted by an open triangle. A stone beacon, 6 ft. high, called *Carl-von-Schlick,* stands about half a cable seaward of beacon E. The North beacon, painted white, consists of a triangular base surmounted by a pole carrying a barrel; the South beacon is similar but painted black.

The northernmost pair of beacons, E. and F., in line with Carl-von-Schlick E. ½ S., lead over the bar in 17 ft. at low water, a conspicuous sand-patch ap pearing in the same line. A buoy lies a short distance within the bar in 27 ft. denoting the fairway, just South of the bar beacons in line. Having crosse the bar, steer towards the pier in a southerly direction for about 3½ cable passing a cable's length to the eastward of the *staff and cage* on the *Inne Blinder Rock*, and between two 4-ft. patches lying respectively N. by W. an N. by E., nearly a cable distant from the end of the pier; in the passag between these patches there is only 6½ to 8 ft. at low water springs. Ancho a little to the southward of the pier in about 10 to 12 ft. water, with th North end of Robbe Islet bearing W. by N. ½ N.

A current, which increases with southerly winds, sets continually throug the narrow southern to the northern passage. Northerly winds check thi current, and with a continuation of the same it will run in a southerly direc tion, seldom, however, exceeding half a knot per hour.

A Pilot may be obtained by making the usual signal, and strangers shoul not attempt to enter without one.

High water on full and change, at 2ʰ 35ᵐ; springs rise 5¼ ft., neaps 3½ fee

John Owen Bay is a small indentation just to the southward of Po Nolloth, with sufficient water for small vessels of 8 or 9 ft. draught, but th bottom is rocky. *MacDougall Harbour*, three-quarters of a mile farther on, i a small inlet protected by the reefs, but its shallowness renders it to be of n importance. Its shore consists of soft sand, and there is a well of brackis water near to the house at the South end of the beach.

Koussie, Kowsie, or Buffels River, enters the sea in about lat. 29° 41′ S and may be recognised by two chains of hills bordering its banks, and also b a remarkable sand cliff at the summit of a flat sand-hill, 400 or 500 ft. high *Penguin Rocks*, 4½ miles North of the river, are easily distinguished. Th river may sometimes be entered by boats, in the rainy season, but only a high water. It is closed at times, however, in the dry season, by the shiftin of the sand-hills in windy weather. This may well be called Salt River, a the salt water runs up it about 15 miles, 10 miles of which is very shallow.

The coast continues in the same direction 135 miles more to the south ward, or lat. 31° 40′; in which space are some small rivers and extensiv sandy plains. *Zwarte Lintie River*, 40 miles S. by W. of the Koussie, i entirely barred by sand.

HONDEKLIP BAY, about 3½ miles southward of the mouth of th Zwartlintje, is frequented by very small vessels coming for copper ore, and i so named from a large block of granite, 17 ft. high, and painted red, near th shore on the South side of the bay, called the *Dogstone*, which is in about la 30° 19′ 10″ S., long. 17° 16′ 25″ E. There being no fresh water here, it ha to be brought from Cape Town.

"The limited capacity of the inner anchorage, and the nature of the oute one, which is quite an open roadstead, with indifferent holding-ground, an the exposure of both to the rollers and to the heavy westerly winds, whic blow sometimes on the coast, seem to preclude the idea of Hondeklip being very safe or a very important port of shipment; but the frequency, especiall in summer, with which advantage can be taken of the facilities afforded b the shortness of the bar in ordinary weather, by the moderate distance of th outer anchorage, by the goodness of the beach, on which boats may be hauled up beyond the reach of the heaviest weather, and by other circumstances, is much in its favour."—*Commander Nolloth*, 1854.

The following directions are by Capt. J. R. McDowell, 1864. In approaching the land, it is desirable to make a low hill about 18 miles South of Hondeklip, on which is a cairn or pile of stones called Maclear Tower. The white sand-patches on the coast below this hill present a very marked feature, being peculiarly forked.

At the back of the tower, about 50 or 60 miles inland, high mountains can be seen on a clear day. The northernmost of the range is Kamiesberg, 5,000 ft. high, and when Maclear's Tower bears East the Kamiesberg will be about E.N.E. It is not advisable to approach the coast too closely here, as several rocks and reefs project far out from the shore.

Having made this land, if at evening, it will be prudent to heave to, or keep under easy sail, with the ship's head off shore, as the current may sweep her past Hondeklip in the night; but if with good daylight and breeze, she can continue along the coast northward. The first peculiar appearance will be Roodewall Bay, with its high, precipitous, red sandstone face. Roodewall Bay is merely a boat cove, 12 miles South of Hondeklip. You will then shortly sight the White Beacon, about a mile South of Hondeklip, which is reared on a rocky point projecting seaward.

The anchorage beacons, red and white pyramidal, with a mast in the centre of each, will then be before you. They are erected to enable vessels to bring up without a pilot, should the weather prevent a boat crossing the bar. By bringing these two anchorage beacons in one S.E. ¼ S., and anchoring on that line (*nothing to the South of it*), in not less than 20 and about 22 or 25 fathoms water, and about 2 miles off shore, you cannot err. In the winter it is advisable to bring up a little to the northward of this line. The Hondeklip will bear S.E., and the White Beacon S.S.E.

A boat will always be sent off when a vessel approaches, should the bar be safe. The signal staff is in the bight of the bay near to the jetty, and signals made will be duly replied to. The current on the coast usually sets to the North, but after a long continuation of northerly winds it sets to the South. It is high water, on full and change, at $2^h\ 30^m$; tide rises 5½ feet.

Roodewal Bay.—About 9 miles southward of Hondeklip Bay is *Roode Wall* (*Red Wall*), or *Mitchell Bay*, surrounded by cliffs of red sandstone; hence its name. There is good anchorage for schooners and small craft in this bay, sheltered by a rocky spit projecting from the South point. The bar is very uncertain even in fine weather, and the landing is bad.

"About a mile to the southward of Roodewal, the occasional *River Spoeg* debouches into a sandy bay, which is much sheltered from the S.W. by a patch of rocks about half a mile from it. If means could be found to work boats in this bay, and if its position be at all central with regard to the mining districts, it would be an important anchorage for ocean vessels in the summer season, and it seems worthy of a longer and closer examination than we were enabled to bestow on it. About 5 miles to the southward of Roodewal, and 1½ mile inland, is a beacon on a hill, 636 ft. high; it was one of the trigonometrical stations, used by the Astronomer Royal at the Cape, for measuring an arc of the meridian, and, in clear weather, makes a very conspicuous sea mark."—*Commander Nolloth, R.N.*

At 8½ miles southward of Spoeg River is the small *Bitter River*, and 16½ miles farther on is *Groene River*, entirely barred. Hence the coast trends for 60 miles to the southward to the entrance of *Olifant* or *Elephant River*, with no place of interest to the sailor between. This river is barred, and will only admit small boats in very smooth weather. The coast between *Milkbosch Point*, in lat. 29° 49′ S., and Bitter River, is fringed with sunken rocks, some of which extend as far out as 1½ mile from the land. Great care must therefore be exercised when running along the coast towards any of the small bays, situated between these latitudes.

"Within the bar (of Elephant River) there is plenty of water for a large ship, for the distance of 2 miles up the river in front of a small village, where several Dutch farmers reside, and carrying bold water for a long distance inland. If there could be a passage cut through the bar at the mouth of this river, it would be the finest harbour on the West Coast of Africa. The inhabitants are principally engaged in rearing cattle, only cultivating sufficient grain for their own consumption. Fish may be caught in great abundance in the mouth of this river, within the bar."—*Capt. Morrell.*

Hence to St. Helena Bay the coast is lined with bluff sand-hills, and exhibits evidences of once having been agitated by volcanic disturbances, pumice stone, lava, &c., being frequently met with. *Donkin Bay*, the South point of which is about 15 miles S. by W. ¼ W. from Olifant River, affords anchorage in 10 to 6 fathoms, sand, but is quite open to the West. The coast in the vicinity of Donkin Bay is very level, and when 5 miles from the land there are few objects near the shore by which a vessel's position may be determined; inland there is a remarkable table land of moderate height, which terminates in a perpendicular bluff to the northward. This is hidden behind the nearer land when about 4 or 5 miles from the coast, and bearing about S.E.

At 9½ miles farther on is *Lambert Bay*, in which there is anchorage for small vessels. Many farmers reside in this neighbourhood.

About 13½ miles S.W. by S. ¾ S. from Lambert Bay is *Cape Desejada* or *Deseada*, a low sandy point at the foot of some sandy hills rising to 700 ft.; it is the N.E. boundary of St. Helena Bay, and at 3 miles N.W. by N. ¾ N. from it is a rocky shoal, which breaks in rough weather. At a short distance inland, within Cape Deseada, the country rises into abrupt craggy eminences and broken ranges of lofty hills, which extend to the S.S.W. and terminate in the *Piket Berg Mountains*, the highest peak of which, named *Kapiteins Kloof*, 3,410 ft. high, is about 22 miles E.S.E. from the entrance of Berg River, and is very conspicuous from seaward, but must not not be mistaken for a higher range inland. When bearing S.S.E. the Kloof range appears as two sharp peaks close to one another, the eastern being the lower. To the right of these appears a rounded hill not quite so high, which slopes gradually, then rises again to a moderate height in a gradual slope, and terminates with the appearance of a rounded bluff, which, when seen at a distance, appears to slope down to the water, the considerable tract of low land between it and the sea not being visible. *Klein Tafel Berg*, a conspicuous hill, 1,190 ft. high, appears from seaward to be much closer to the beach than it really is.

ST. HELENA BAY.—*Paternoster*, or *St. Martin Point*, low and sandy, with a reef projecting half a mile to the northward, lies in lat. 32° 42′ 12″ S., long. 17° 55′ E. This point forms the western side of St. Helena Bay, which lies between it and Cape Deseada; the distance between being 31¼ miles E. by N. ¾ N. In the bay are regular soundings of 12 to 10 fathoms, decreasing to 6 and 4 fathoms near the shores. The ground is mostly of sand and shells. It is, however, to be observed that the whole of the western shore to the bottom of the bay is bordered with a continued reef of rocks, half a mile in breadth. This reef terminates at *Berg River*, which falls into the bottom of the bay, and has a few houses on each side, with several springs near it, the water of which is said not to be wholesome.

Berg River passes through some of the richest districts of the Cape Colony, and on its banks are some of the best wine districts, particularly one called the Vale of Drakenstein, from which much of the wine brought to Cape Town is derived. Its water is peculiarly wholesome, and well adapted for shipping. The casks may be floated up with the flood about 5 miles, and then filled and floated back to the ship with very little trouble. Supplies of beef, mutton, vegetables, &c., can be procured from the farmers on the river bank.

There are three principal anchorages in St. Helena Bay, all in the South or S.W. part of it. The first is that off the Berg River, at 3 miles from its mouth, in 5½ fathoms, with its East point bearing S.E. by S. ½ S., and Point St. Martin, N.W. by N. ½ N. The second and best anchorage is 1 mile off shore, abreast of the town, in 7 fathoms; Cape St. Martin bearing about N.N.W. or N.W. by W. ½ W. The town is a small settlement and military station at the bottom of a small bay, 6 miles from Cape St. Martin, to the East of which is a high hill, called *Partridge Hill*. The third anchorage is before *Stump Nauss Bay*, a small cove 3 miles from Cape St. Martin, in 9 fathoms.

Britannia Reef is a rocky shoal, first found by a ship of that name striking on it, and which was compelled to run ashore in Stump Nauss Bay. It is about 1½ mile long East and West within the 10-fathoms limit, and half a mile broad. The highest part, visible at low water, is 3 miles N.W. ¾ N. from St. Martin Point. Another sunken rock lies 1½ mile W. ½ N. from Point Paternoster, and from the same point a reef of rocks and islets extend 1½ mile N.W.

In summer, when southerly winds prevail, the anchorage here is safe; the bay being open only to winds from between N.E. by N. and N.N.W. It is equally unsafe during the winter, when north-westerly winds may be expected. It is high water here at $2^h 20^m$; tide rises 6 ft.

A broken and rugged coast extends for 22 miles southward, curving to the westward, between St. Helena Bay and *Saldanha Bay*, in which there are several small coves, and numerous dangerous rocks at a considerable distance from shore.

The first of these coves is *St. Martin's Bay*, to the West of the cape, but which affords no shelter. A reef extends off it, and ships should not come into less than 34 or 35 fathoms to pass these breakers. Beyond this the coast forms three projecting rocky points, with as many slender bays between them, the last of which is called *Paternoster Bay*, at the bottom of which is a building called the Custom-house. A road leads from it to the Berg River. Th bay has only indifferent shelter for boats.

Point Paternoster, 2¼ miles S.W. by W. ¾ W. from St. Martin's Point, i the West point of the last-named bay, and also the N.E. limit of another ba whose southern point, 5½ miles to S.W. ¾ W., is called *Castle Point*, owin its name to the singularly-formed hill which surmounts it. *Castle Bay*, this is called, is 5 miles wide, has a sandy beach, but no shelter. A fishe man's house stands at the bottom of it. A reef of rocks fringes the cape, an extends nearly three-quarters of a mile off, the outer one being visible at lo water. A rocky ledge, called *Jim Crow Rocks*, and on which the sea break in heavy weather, lies N.N.E. 2¼ miles from the cape; and a dangerous shoa with only 9 ft. water on it, lies W.S.W. 1½ mile from the cape.

At 4¾ miles S.S.W. from Cape Castle is *Duminy Point*, the coast betwee forming *N.W. Bay*, which affords no shelter from the westward. A roc which is awash at low water, lies 1¼ mile outside the line between the tw points forming the bay, and from it Duminy Point bears S.S.E. 2 miles; ther is also a dangerous reef, part of which is awash at high water, running W. ½ S. 1⅔ mile from the same point. From Duminy Point to *Fish Point*, miles distant, the whole coast is fringed by rocks and foul ground, extendin upwards of a mile off shore; several of the rocks are awash at high wate and the highest part of one, called *Jacob Reef*, situated S.W. by S. ¾ S. miles from Duminy Point, is 12 ft. high.

Danger Bay lies between Fish and *Long Points*, a distance of 1¼ mi S. ¾ W., but this is contracted to only two-thirds of a mile by the rocks whic run off S. by W. ¾ W. from Fish Point. As this bay lies open to the wes ward, and there are several sunken rocks off the entrance, which sometim break, it must always be dangerous to approach by a stranger, although small vessel might in a case of necessity obtain an anchorage in 3 to 4 fathom about a quarter of a mile from the South part of the bay, well sheltered fro S.W. winds.

Cap Rock, which uncovers at low water, lies N.W. by W. ½ W. seve eighths of a mile from Long Point, with 10 to 11 fathoms between it and th sunken rocks off the point. The mark to clear this rock is Schooner Islan and the peak of Jutten Island in line S.S.E.; this mark also clears the dange off the coast up to the entrance of Saldanha Bay.

The greatest care must be exercised when navigating in the vicinity of th above-mentioned dangers, situated between Saldanha and St. Helena Bays, many of them rise almost precipitately from the bottom, having as much as 1 to 25 fathoms close-to.

At night a vessel ought to keep the deep-sea lead going, and take car not to go inside of 50 fathoms; this depth will keep 3 to 4 miles outside of a dangers.

SALDANHA BAY.—The entrance of this fine harbour, through a ridge granite hills, lies between 33° 3′ and 33° 6′ S. Its North point is in lon 17° 54′ 30″ E. On its North side, at the entrance, is a little isle called *Mal gassen*, and on its South side another, called *Jutten*. At 2¼ miles eastward Malagassen is a similar isle, *Marcus*. These isles are too low to be discerne at a distance, and, in steering for the bay, the latitude will be the best guid The entrance is broad and clear; but Marcus may, if requisite, be passed the northern side, and may be approached to half a cable's length. The passage on the South side is, however, to be preferred. A bay to the N.W. of Marcus is called *Bavian's Bay;* and another, more to the northward, *Houtjes,* or *Hoetjes Bay;* these are divided by a promontory, which terminates in sunken rocks. On this cape, *Point Houtjes,* a signal-staff was erected in 1845.

In the principal channel, between Jutten and Malagassen, the least depth is 13 fathoms, bottom of sand. Marcus, and the North and South points of the main land, are bold-to. Within 50 fathoms of the island is 6 and 7 fathoms, clear ground; but within 50 yards is also 7 fathoms, and foul ground; the same from the island to the North point of the main land, forming Houtjes Bay, off which, at about a cable's length, is a rock, not larger than a small boat, dry at low ebbs.

In Houtjes Bay, on the North side, there is good anchorage for the largest ships; and there is deep water on the West side of it, close to a natural pier of granite. Here ships may lie in perfect safety, in all seasons. Those in want of careening, or repair, used to be sent here from the Cape.

Houtjes Bay has regular soundings of 5½ and 4 fathoms, sand and shells, with from 7 to 10 fathoms to the eastward. The best anchorage is in 6 fathoms, with the West end of Marcus and the southernmost extremity of the bay in one; or a little farther in, in 5 fathoms, where you will be completely sheltered. It is here to be noticed, that S.E. ¼ S., 3 miles from Houtjes Point, is a sunken rock, called the *Blinder-klip,* which is not visible even at a low ebb, when there is 3 ft. water over it, unless the wind blows strongly. The distance of this rock from the sandy beach of the main is more than a mile; the depths between, from 7 to 4 fathoms, sand and broken shells. The Blinder-klip lies with the Mouse Back (a high piece of land on the northern shore) and Marcus Island in a line.

At the entrance of the lagoon, on the South of Saldanha Bay, are two islands, Schaapen (*Sheep*) and Meeuwen (*Mew*); 2 miles within these, on the western shore, is the Government Residence, the channel to which cannot be attempted by verbal directions only. In working up to Schaapen, keep your lead going, as the soundings to the north-eastward are regular, and will be your best guide; but, in standing back to the S.W., bring the N.W. end of Schaapen Island in one with a saddle hill on the western side of the lagoon, and then put about, as the water shoalens quickly afterwards.

Saldanha Bay is an excellent place for ships that require the repair of any damage caused by stress of weather at sea. Bullocks and sheep may be obtained from the farmers at a moderate price; and plenty of fish may be caught, either with the net or with hook and line. The inlet called *Riet Bay,* on the S.W. side, is the best place for the net and seine, it having only 6 or 7 ft. water, with sandy ground. To other places, being rocky, the hook and line only are adapted. The islands swarm with wild rabbits.

Saldanha Bay is one of the finest harbours in the world, but, from the want of water, was little frequented. Sir John Barrow, impressed with its importance for naval purposes to England, proposed a canal to be cut from the Berg River, which falls into St. Helena Bay, to the N.E. corner of Saldanha Bay, and thus obtain a plentiful supply of excellent water. But the necessity of this was removed by the discovery of a copious spring on Schaapen Island, in 1841.

On tracing this up, it appeared that the fountain had evidently been discover many years ago, but had been carefully concealed; and, in working to i source, it was found to be purposely sealed by masonry and cement, and i course carried through a channel into the sea, 11 ft. below low water mar evidently with the intention of hiding its existence.

From South Head the coast continues hilly as far as *Vondeling Island,* miles to the southward, and one-third of a mile off shore. From hence t coast, low and sandy but safe to approach, extends for 14 miles nearly straig to *Ijzen Fontein Point,* a rocky point fringed with reefs, with a hill, 276 fe high, close to it.

Dassen, or Coney Island, in lat. 33° 26′, lies about 22 miles southward the entrance of Saldanha Bay, and 4 miles W. by S. ½ S. from the headla named *Eyserberg,* or *Isen Point.* It is a low, sandy island, the resort of i numerable penguins. The shore is foul on its North, West, and South side with breakers that run out more than a mile into the sea, but fair on the Ea side; and on that side, in 16 fathoms, the bottom is of white sand, with go anchorage, about half a mile off. *Leewen Rocks,* under water, lie about 1 mile S.W. by S. ½ S. from the South end of the island.

Two sunken rocks, with respectively 5½ and 6½ fathoms at low water, an on which the sea breaks heavily during and after bad weather, lie 3½ mile from the south-western shore of Dassen Island. They were discovered in 186 by Lieut. W. F. Archdeacon, R.N.

The rocks are N.W. ½ W. and S.E. ½ E. from each other, distant 1¼ mil with deep water between. The western rock, with 5½ fathoms on it, is stee to on the western side, 20 fathoms having been found at a distance of 1 cabl From this rock the southern point of Dassen Island (which is the highes bears N.E. by E. ½ E. 3¼ miles, and the conspicuous high sandhill at Boc Rivière, S.E. ¼ S.

The eastern rock, with 6½ fathoms on the shoalest part, has depths excee ing 20 fathoms at a cable's distance all round. From it the southern poi of Dassen Island bears N.E. ½ N. 3½ miles, and the sandhill at Bock Rivièr S.E. ¼ S.

At 15½ miles S. ¼ E. of Ijzen Fontein Point is *Bok Point,* the intervenir coast being sandy. *Ronde Berg Breaker,* a dangerous sunken patch of 4 fathoms, lies 2½ miles off the shore 7 miles North of Bok Point. From Bo Point the coast trends southward 11½ miles to *Melkbosh Point.*

ROBBEN or Penguin Island, lies at the distance of 24½ miles South fro Dassen Island, and 5 miles N. by E. ½ E. from the lighthouse on Green Poin the West side of the entrance of Table Bay. It is rather higher than Dasse Island, and nearly 2 miles in length North and South. The western an southern sides are surrounded with heavy breakers, and a sunken rock, calle the *Whale,* with about 6 ft. water over it, lies at the distance of a mile S. ½ W from the southern point. The 4-fathoms boundary extends half a mile off th eastern shore. Ships may anchor off the eastern side of the island, in from 1 to 12 fathoms, at 1 or 1½ mile from shore, or within three-quarters of a mil from the island, in 9 or 7 fathoms, and sheltered from a S.W. swell by th island and reefs. The best position for a large vessel is, with Whale Rock (o which the sea almost constantly breaks) open to the eastward of the Sout point of the island, bearing S.W., and the North extreme of the island N.W. ½ N in 8 or 9 fathoms. Smaller vessels may lie closer, with Whale Rock shut in by the S.E. point of the island, in 5 or 6 fathoms. A ship may thus lie until the wind comes to S.W. or West, which generally happens in the morning during the fair season: then weigh, and, if requisite, reach the anchorage in Table Bay. A vessel may also find good shelter from N.W. winds under this island, when she would be quite exposed in Table Bay. Sailing vessels should not use the channel between Whale Rock and Robben Island, on account of the uncertainty of the currents.

The **LIGHTHOUSE** on Minto Hill, the highest and South point of the central ridge, shows a *fixed bright* light, at an elevation of 154 ft. above the sea, and, in clear weather, should be seen at a distance of 20 miles. The illuminating apparatus is dioptric or by lenses of the first order. The tower is painted white, and is 76 ft. high from base to vane, and in lat. 33° 48′ 52″ S., long. 18° 22′ 33″ E. of Greenwich.

The General Infirmary for lepers, lunatics, &c., is on the south-eastern part of Robben Island, and there are generally about 300 of these unfortunate patients here, who, of course, are kept under strict supervision as to visitors. There is a landing cove near the hospital, but the best is in Murray Bay, on the N.E. side.

Blaauwberg is a dark, round hill, rising to an elevation of 745 ft., at 1¼ mile inland from the main shore opposite Robben Island. It is 5½ miles E. ¾ N. from Minto Hill, and may be considered the northern boundary of the approach to Table Bay. The channel between Blaauwberg Beach and Robben Island is 3½ miles in width, but the narrowest part, between the 7-fathoms lines (within which no vessel should venture), is 2½ miles, with soundings from 7 to 10 fathoms.

To the southward of Blaauwberg the shore, for 2 miles, is composed of a number of white sandhills, 100 to 200 ft. high; it then gradually curves to the south-westward for 6 miles, to the mouth of Salt River. The whole of this space is very deceptive to vessels standing into the bay at night, or in hazy weather, from the close resemblance the sand bears to the water. From this cause many vessels, *disregarding the lead*, have been stranded or wrecked midway between Blaauwberg and Salt River.

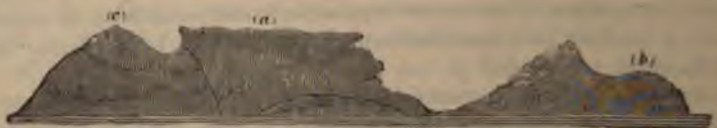
The mouth of *Salt River*, which is fordable in summer, but very dangerous in winter, (it being an extensive quicksand, in which both men and cattle have perished), is in the S.E. bight of Table Bay, and S.E. ½ S. 2¾ miles from Mouillé Point lighthouse. Another winter mouth to the river is formed E. by S. ¾ S. 3½ miles from Mouillé Point, and is fronted by a rocky reef, with 3¾ to 5 fathoms over it, at the distance of three-quarters of a mile from the shore. The sea breaks over this spot after heavy N.W. gales; with this exception, the water shoals regularly from 8 fathoms to the sandy beach between Blaauwberg and Salt River. There is nothing to distinguish this winter mouth, but Salt River has a large white farmhouse close to its entrance.

A range of tolerably even hills, called the *Tigerberg*, 1,350 ft. high, and 6 miles in length, extends N.N.E. and S.S.W., 5 miles within the eastern sandy shore of Table Bay. With the exception of Blaauwberg, these are the only elevations in the neighbourhood of Table Bay, North of Table Mountain.

The southern promontory of Africa, commonly called the *Cape of Good Hope*, is a peninsula, about 28 miles in length, composed of a vast mass of mountainous and rocky land, between the latitudes of 33° 54′ and 34° 22′ S. The North end of the promontory forms the West side of *Table Bay*, on the South coast of which stands *Cape Town*, having near it, on the West, the *Lion's Mountain*, 2,180 ft. high; at 2 miles from it, to the South, the *Table Mountain*, 3,550 ft.; eastward of which is the *Devil's Berg*, 3,270 ft., and other elevations.

The Cape Peninsula may be said to be composed of two mountainous tracts, separated from each other, and from the main, by an isthmus of low sandy plains, 11 miles in breadth, dividing Table Bay from False Bay.

The northern tract is composed of the famed Table Mountain, that of Constantia, and several others of less note, and contains many very valuable estates, particularly those of *Constantia* and *Hout Bay*; while on the southern range, from Hout and Fish-hook Bays, southward, to the Cape Point, there is not one estate valuable for its productions, although the land is capable of great improvement.—*Owen*.

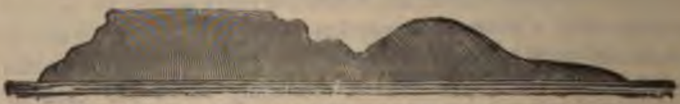


The Land over Table Bay. (*a*) *Table Mountain.* (*b*) *Lion's Rump.* (*c*) *Devil's Berg, S.S.E. 36 miles.*

The Cape of Good Hope, on approaching either from the westward or the eastward, has the appearance of a large island, when you are at such a distance as not to be able to discern the connection between its mountains. Of all the land, the highest and most remarkable is the Table Mountain, which appears quite level, and falls down perpendicularly at both ends, till it joins the high lands near it. It may commonly be seen, in the offing, at the distance of 30 miles; and, in very clear weather, may be discerned at 45 miles.

Here it may be noted, that an eddy current commonly sets from the northward into Table Bay, between Robben Island and the shore; while, at the same time, the regular current is setting around the cape and to the northwestward. Vessels bound to Cape Town, therefore, make the land to the southward of the bay; from want of this precaution some have driven as high to the northward as Dassen Island, a distance of 30 miles, and vessels have been lost here.

In the offing westward of the Cape Peninsula, it appears that, at 4 miles from shore, there is no bottom at 40 fathoms; and off the high land, N.W. of Hout Bay, there is no bottom at 40 fathoms at 1½ mile from shore. From Hout Bay to the Cape the water is less deep; the depth varies from 24 to 10 fathoms, rocky bottom, at from 1 to 3 miles off shore. The precaution, therefore, of using the lead when approaching the Cape should never be omitted, if doubt exists as to the accuracy of the vessel's position.



The Table Land, bearing N.E. ¾ E. [N.N.E.], distant 45 miles.

The Table Mountain is composed of a sandstone of many colours, but chiefly of a white granular quartz, passing, in some places, into quartz rock. The mountain rests on a granite base, which is passed at the waterfall a little above the mill, and at the elevation of 500 ft. above the sea. There are vast blocks of granite in Camps Bay, on the West side of the mountain; and it appears to lie N.W. and S.E., traversing the Kloof from the Lion's Head, appearing abundantly in Table Bay.

During the summer season at the Cape, the S.E. is the prevalent wind. It is, in fact, analogous, in some degree, to the trade wind and sea breezes of the tropics; but we must be careful to confine it to the southern and eastern coasts —it then becomes a true sea breeze, or a rush of cool air upon the heated plains. But there is a remarkable circumstance connected with the S.E. wind at Cape Town, viz., the dense mantle of vapour which rests upon Table Mountain, and rushes over its precipitous sides like a cataract of foam and vapour. This peculiar appearance is called by the inhabitants the *Table Cloth*, or *Cap;* and by the French the *Perruque*.

This well-known meteor and its cause is described by Sir Thomas Maclear, thus:—By observation, it appears that the temperature of the air decreases nearly 3°.38 for each 1,000 ft. of height, or about 300 ft. for 1° of Fahrenheit's thermometer. If, therefore, the stratum of air, in the ordinary humid condition, should be suddenly lifted 3,600 ft., viz., to about the height of Table Mountain, its temperature would be lowered by 12°, and a portion of the humidity would be condensed in the form of cloud or fog, irrespective of each cubic foot becoming lighter by about 61 grains.

The strong and occasionally violent southerly winds, which prevail during these months, effect the displacement. Table Mountain, like a huge wall, receives some 4 miles in breadth of the current, which bounds up with diminishing temperature, and deposits the celebrated "table cloth or cap" on the top. The upper surface of this majestic white cap is smoothed off like a well-dressed peruke; its North border hangs over the precipice, drapery fashion; but during very strong winds it pours down like a cataract to about 1,000 ft. from the top, where, entering a warmer temperature, it dissolves and disappears. Not the least interesting of the phenomena occasionally attending it, is the *revolving* mass of detachments which hovers over Cape Town, fed by a stream of shreds from the cap on one side, which are dispersed or thrown off on the other, and float towards Table Bay, where they disappear. The "black south-easter" cap differs from the preceding by the *nimbus* tint of a canopy of cloud, which projects on the southern side of the mountain over Rondebosch and Claremont, and from which light rain occasionally falls. The strong southerly winds are ushered in by the *tops* of the higher elevations on each side of False Bay becoming covered in rapid succession from the southward; but these elevations seldom remain covered throughout the gale.

The mean temperature of the winter months—June, July, and August—is 55°, the *humidity* 81°.2, and the temperature of the *dew point* 49°, or 6° below the mean temperature of the air. The prevailing winds are from the North, N.W., West, and occasionally from the S.W., and they are generally accompanied by rain. Hail-storm squalls are usually from the S.W.

TABLE BAY.—The sheltered portion of this bay, the prevalent winds being from seaward, is in the S.W. angle to the southward of Mouillé Point. In ordinary weather it is a safe and convenient anchorage, but in S.E. or N.W gales it becomes dangerous in the open roadstead.

The Breakwater and Docks are among the most important maritime work South of the Equator, and will tend greatly, if not entirely, to remove the evi reputation that Table Bay has had for its turbulent sea in S.E. or N.W. gales By a somewhat singular series of coincidences, the visits of H.R.H. Prince Alfred have been identified with this grand undertaking. On September 17th, 1860, he "tipped" the first load of rubble-stone for the breakwater The excavation of the docks afforded the chief material, and this was quarried by the labour of 600 convicts. On August 25, Prince Alfred laid the first stone of the graving dock; and on July 12th, 1870, he formally opened them, although they had been partially in use since May 17th previously.

The breakwater extends about 1,850 ft. from the shore, about half a mile southward of Mouillé Point, in an E. by N. ½ N. direction, or into 32 ft. at low water. It is proposed to carry it 1,000 ft. further into much deeper water, in an E. by S. ½ S. direction which would protect the inner part of the bay from the dangerous N.N.E. gales.

The Docks.—At the inner end of the breakwater, on the South side, is the outer basin, 850 ft. long, 263 to 380 ft. broad, with an entrance 200 ft. wide. The depth at low-water springs close up to the East jetty is 18 ft., gradually decreasing to 7 or 8 ft. at a distance of 50 ft. off the western side of the dock; at the entrance there is a depth of nearly 21 feet.

The inner basin, or *Alfred Dock*, is to the southward of the outer, and to enter it a vessel has to cross the South end of the latter, and then pass between two jetties for a distance of about 100 yards; this passage is from 100 to 120 feet wide. The inner basin is 1,000 ft. long, 400 to 450 ft. broad for two-thirds of its length from the North quay, the remaining portion is only 250 ft wide. There is an uniform depth of nearly 21 ft. at low-water springs in the passage from the entrance to the outer basin to the entrance of the inner, and inside the basin 24 ft. over the whole of the northern part, decreasing to 19 and 20 in the southern portion. There are two jetties or piers to protect the entrance to the basins; the South jetty is 240 ft. in length, and 20 ft. in breadth. There is landing at the jetty, which is close to the citadel, and causeway adjoining the custom-house. At the South end of the Alfred Dock a patent slip is in operation, capable of taking up ships of 1,500 tons; and dry dock of 375 ft. by 65 ft., with a depth on the sill of 18 ft., is in course o construction. A railway passes along the quays, and to Cape Town, a distance of about a mile.

There are no light or other dues on shipping visiting here, except the charge on ships in the Alfred Docks, which is 6*d*. per ton register for the first month, and 1*d*. per like ton per week afterwards.

These works were designed in England by Mr. Coode, C.E., and carried out by the resident engineer, Mr. A. T. Andrews, C.E., and have cost about £345,000.

Before the construction of the breakwater it was extremely dangerous to remain in Table Bay after the 10th or 15th of May, for the N.W. winds may then be expected to set in, and they blow so violently that no ship can possibly ride them out. The Dutch never suffered their ships to be there after that time. N.W. gales are experienced in every season, but they seldom blow home in the bay from November to May; but several ships have been driven on shore by them, even in the month of April.

Table Bay is an excellent place for all kinds of refreshments; wood is scarce and dear, but there is plenty of good water. Coal is to be obtained at the new timber jetty, or is brought alongside in lighters, holding about 20 tons, at a cost varying from 45*s*. to 60*s*. per ton. Sheep may be obtained at very moderate prices, with other provisions, vegetables, and fruits. If bread is wanted in large quantities, it will be baked in a short time. The water is brought down in pipes to the head of the jetty near the castle, where boats fill it with hoses leading from the pipes to their casks; but there are several vessels, with tanks, force-pumps, hose, &c., fitted up for conveying water to the shipping in Table Bay. The water is excellent; and in the flourishing days of the Dutch East India Company the men-of-war of that nation, which frequently put in here, were compelled to bring home a few pipes of it for the use of the Royal family. The air is generally cool in the night, although the sandy soil is greatly heated by the sun during the day; and this causes land winds from Table Bay to come off in hot gusts in the evenings, when their course is over such ground.

The water of Table Bay exhibits a very different appearance, according to the quarter from which the wind blows. With a N.W. wind the water is dirty red, and turbid, as if mingled with a small quantity of blood. After a S.E. wind, on the contrary, the water is so beautifully pellucid, that the anchor, by which a vessel is riding in 10 fathoms, may be distinctly seen from on board.

Table Bay is much exposed to the wind and sea from the North and N.W. during the winter season, when the wind prevails from those quarters, and sends a heavy swell into the bay.

CAPE TOWN lies in the bight of Table Bay. It is the capital of the Cape Colony, and was first founded by the Dutch, in 1650, in whose hands it remained till 1795, when the British took possession of the town. By the treaty of Amiens it was restored to the Dutch; but, being again taken by the British in 1806, was finally ceded to us in 1815. In 1875 the population amounted to 33,239 persons. In 1875, 797 vessels, of 429,139 tons total burthen, entered here. The new Docks, previously described, increase its commercial importance, and do away, in a great measure, with the danger formerly experienced during the prevalence of N.W. winds. Cape Town affords many advantages to shipping. It is in electric telegraph communication with the Cape lighthouse, so that passing ships can be reported here. There are repairing ship-yards, adapted for all ordinary requirements, and a slip for hauling up vessels of 13 ft. draught. Water is easily obtained, and excellent, and coal is abundant, as before stated. The chief towns in the interior are in telegraphic communication with Cape Town, which is also in direct cable communication with England, *viâ* Aden. A railway connects Cape Town with Wynberg, 10 miles to the S.E., and another railway extends in an easterly direction into the heart of the colony. There is a railway to the new Docks, before mentioned.

The *Royal Observatory* is a large and handsome structure, situated about 2½ miles East of Cape Town, on a flat sandy heath, The central part of the building is allotted to the instruments, and the two wings form the residences of the astronomer and his assistants. It was erected under the superi tendence of the late Mr. Fallows, at an expense of £30,000. It is in la 33° 56′ 3″ S., long. 18° 28′ 45″ E., or $1^h\ 13^m\ 55^s$ E. of Greenwich. In front o this is the time-ball apparatus, hereafter described.

LIGHTS.—Green Point Light.—A lighthouse stands upon Green Poin the western extreme of Table Bay. It is a rectangular building, 52 ft. hig 400 yards within the rocks at low water, and exhibits a *bright* light, showin a *flash* every *ten seconds*, at an elevation of 65 ft. above the sea, visible, i clear weather, at a distance of 13 miles. The illuminating apparatus is dioptri or by lenses, of the third order.

Mouille′ Point Light.—From Green Point the land trends E. by S. ½ S. t Mouillé Point, the N.W. horn of Table Bay, upon which is erected a light house, 100 yards within low-water mark, and 1,195 yards from Green Poin lighthouse. A *fixed red* light is exhibited from it at an elevation of 44 ft. visible, in clear weather, from a distance of 10 miles. The illuminating appa ratus is dioptric, or by lenses, of the fourth order. The tower is round, 30 f high, and painted in alternate red and white bands.

Breakwater Light.—A *fixed green* lens light, of the sixth order, is place on a travelling platform at the outer extremity of the breakwater, at an eleva tion of 25 ft., and is visible when bearing from S. by W., round by West t North. It will not be seen from vessels until eastward of Mouillé Point light and is moved further in-shore in rough weather.

A small *fixed green* light is shown (only during northerly gales) at the com mencement of the old South jetty at Cape Town.

Time Balls.—A time ball is erected at the flagstaff, before the South fron of the Observatory, for the purpose of daily (Sundays and Good Friday excepted) communicating to the ships in the harbour the instant of noon Cap mean time, which corresponds to $10^h\ 46^m\ 5^s$ Greenwich mean time.

As the rate of a chronometer obtained on shore rarely agrees with the tru rate at sea (the motion of the ship and other causes producing the alteration), it becomes necessary to ascertain the sea rate after the chronometer has been placed on board in the berth it is to occupy during the voyage, and from which, on no account, should it be removed throughout that period.

The present contrivance furnishes a convenient method for obtaining this important object, without any calculation or difficulty. All that the observer has to do is to note the instant of the fall of the ball from the top of the staff, by chronometer; then $10^h\ 46^m\ 5^s$ subtracted from the time by chronometer gives the error of chronometer, or Greenwich mean time, which, compared with the error obtained at departure, will give the rate during the interval.

An *additional time ball* has been established at the Lion's Rump signal station, and another at the N.W. corner of the Alfred Dock, as that attached to the Observatory is not visible from the whole of the Table Bay anchorage, owing to the intervention of buildings. As in the other case, the observer should note the time by his chronometer when the ball begins to fall; and, by subtracting one second from that time, he will have the moment of noon mean time at the Cape Observatory. A gun is also fired by electricity at 1^h p.m., Cape mean time, at the Imhoff battery.

When the vessel continues a week or ten days in the harbour, it will be satisfactory to know the existing rate. If the rate should be trifling, perhaps less than the probable errors of observation, it will be right to diminish the latter, by dividing the observations into two or more groups, and to take the mean of each group for one observation; the differences of these means, divided by the intervals of days, will give a determination near to the truth.

Local Magnetic Attraction being supposed to exist in Table Bay, the Colonial Government appointed commissioners to examine into the subject, and they found, in August, 1873, that there was *no local attraction*. A good mark for ascertaining the deviation of a ship's compasses is Paulusberg, a sharp peak, which bears S. 36° E. (1882) from the centre of the breakwater, distant 29 miles.

DIRECTIONS.—Vessels bound for Table Bay from the southward (by night) should not shut in Cape Point light with the land at Slangkop Point, until Robben Island light—which will be seen before the *flashing* light on Green Point—bears N.E. ½ E., when they may steer for it; and when Green Point light bears East, an E.N.E course may be followed until the *red* light on Mouillé Point comes open northward of Green Point light, bearing S.E. by S. This route will clear Vulcan Rock and the reefs in its vicinity. The course may now be altered to S.E. by E. ½ E., which will carry a vessel one mile northward of Mouillé Point light, and within this distance no stranger should round the point at night. When Mouillé *red* light bears S.S.W., a course about S. by E. may be steered for the anchorage, bearing in mind not to approach the *green* light on the end of the breakwater too close. When the *flashing* light on Green Point is shut in with the hillocks near Mouillé Point, or Mouillé Point *red* light bears N.W., distant about 1 mile, a vessel may anchor in from 6 to 8 fathoms water. Small vessels may anchor in 4 or 5 fathoms, with Mouillé Point light bearing about N.W. by N.

Vessels bound to Table Bay from the northward should give Robben Island a good berth, and not be misled by its light, for the island is low, and the dangerous Whale Rock lies S. by W. ¼ W., only 14 cables from the lighthouse, and 1 mile from the nearest point of the island. Having sighted Robben Island light, a vessel should haul to the S.W., if the light bear anything to the westward of South, until Green Point *flashing* light bears S. by E. or S.S.E., then steer for it until Robben Island light bears N.E., when steer S.E.; and when Mouillé *red* light bears S.S.W., steer about S. by E. for the anchorage.

Entering Table Bay from the northward, and inside Robben Island, keep Mouillé Point light about S.W. by S. ½ S. until past Robben Island, with the lead going. In passing this island, soundings in 7 or 8 fathoms may be struck. When the water deepens to 11 or 12 fathoms, or Robben Island light bears N.N.W., steer about S. by W. ¼ W. for the anchorage. In beating between Robben Island and the main, the soundings shoal regularly towards the island; but when approaching the main, it is necessary to tack at the first cast of the lead in 8 fathoms. It is, however, not prudent for a sailing vessel to enter the bay by this channel, on account of the northerly current.

With Robben Island light and Green Point or Mouillé Point lights a vessel may readily determine her position by cross bearings; but in working for the anchorage the safest and easiest plan to adopt is, whilst Green and Mouillé lights are open of each other, to tack when Robben Island light bears N

W. ¾ W., and when they approach each other, or become in line, to tack when Robben Island light bears N. by W. This will prevent accident from the low Blaauwberg Beach, on the eastern shore of the bay, from its deceptive appearance at night. Little, if anything, can be lost in thus beating in, by giving up the smooth water near the shore, as a constant northerly current sets out between Robben Island and the main land; added to which, the wind blows with greater violence from the S.E., on the East side of the bay, than it does more to the westward, though not in such sudden and violent gusts.

There can be no excuse for neglect of the lead in entering Table Bay, the average depth of water between Green Point and the Whale Rock being 12 and 14 fathoms; and the mid-channel depth, which is the greatest, 20 fathoms only, from which, towards the beach, the soundings gradually decrease. The bottom is foul and rocky to the N.W. of a line joining the Lion's Head and Rump, but East of this it is clear, and a vessel may, if necessary, anchor in any part in from 8 to 10 fathoms, sandy bottom.

In dark or hazy weather, ships should never fail to use the lead in standing into Table Bay. For want of this precaution many have sailed upon Green and Mouillé Points without seeing land, whilst their masts were seen over a fog from the elevated ground at the foot of the Lion's Rump. The fogs that obscure the lights are frequently confined to the low ground in the vicinity of Green and Mouillé Points, extending upwards only 100 to 150 ft. Under these circumstances it is advisable to send a mast-head man aloft, who will probably see land when it is invisible from the deck.

Strangers are recommended not to beat into Table Bay at night, especially in squally or thick weather. Under any circumstances, at night, there is great difficulty in judging the distance of lights situated under high land. Therefore, the prudent course for a stranger is to keep off and on outside till daylight, sufficiently to the westward of Green Point, to prevent being becalmed near the land, and set in upon the coast by the heave of the sea.

Anchorage.—Should a stranger arrive without being boarded, he may anchor with Mouillé lighthouse bearing N.W. ½ N., and Devil's Peak S.S.W., in 6 fathoms, and wait for a proper berth being pointed out by the authorities of the port. From this position the signal-staff on the Lion's Rump will bear W. ½ N.

A good anchorage for large vessels can be had inside the breakwater, in 6 fathoms, with the breakwater lighthouse in line with Mouillé point lighthouse, N.W., and with the S.E. angle of Amsterdam battery, S.W. by W. ¾ W. Two sets of moorings are laid down inside the breakwater, about 450 ft. off the entrance to the outer basin; the northern set is for large vessels, and the southern for small.

An outer anchorage recommended for large ships is in 10 fathoms, with Mouillé lighthouse W. ¾ N., S.E. angle of Amsterdam battery S.W. ¼ S., and the Observatory S. by E. ½ E. Vessels, in the summer season, should moor rather taut, with 100 fathoms on the S.E. anchor, and 40 fathoms on the N.W.; in the winter, with 100 fathoms on the N.W. anchor.

The best ground tackle is required in the N.W., or winter season; and during gales precautions should be taken to prevent surging ahead and slacking your cables between the gusts. It is for want of this precaution that most cases of parting occur.

LEAVING TABLE BAY.—Vessels leaving Table Bay, and bound North, should go out between Robben Island and the main. A current is almost constantly setting to the northward through this channel, and in the summer a fresh south-easter frequently blows, whilst at a few miles to the westward of the island the wind is light and baffling, or fails altogether.

PORT REGULATIONS.—The following are the port regulations, as published by authority, March 1, 1855:—

Article 1.—On the arrival of merchant vessels in Table Bay, a proper berth will be pointed out to the masters thereof by the port captain, when he boards them; and no master of a merchant vessel shall shift his berth, without permission from the port captain, unless in cases of extreme urgency, when he shall report his having done so, as early as possible, at the Port Office.

2.—Should it be the intention of the master of a vessel to discharge or to receive on board any considerable quantity of merchandize, a berth will be pointed out to him, as close to the jetty or other landing-place as the safety of the vessel and other circumstances will admit; and the master will then moor with two bower anchors, with an open hawse to the N.N.E.; taking especial care, in so mooring, not to overlay the anchor of any other ship, or in any way to give the vessel near him a foul berth. Vessels touching in Table Bay for water and refreshments only, may ride at single anchor in the outer anchorage; but in this case it is particularly recommended to veer out 80 or 90 fathoms, if they ride by a chain cable, as the liability of starting or fouling the anchor, or breaking the chain will thereby be greatly lessened; and if riding by a rope or coir cable, to run out a stream or good kedge to steady the ship; and in both cases the other bower anchor should be kept in perfect readiness to let go. When the vessel is properly moored with bower anchors, or well secured with a bower and stream anchors, and with good cables, buoys, and buoy ropes, the master will then take the exact place of the ship by the bearings of two land marks and the depth of water; and should any accident occur, by which the vessel may drift from this situation, or lose her anchors, a good bearing and depth of water must be taken at the time, and the same must be notified in writing to the port captain. It is particularly recommended that vessels be kept as snug aloft as possible, to counteract the effect of periodical winds, which at times blow with considerable violence.

SIGNALS.

3.—The following general signals will only be shown when, from local experience and good barometers, a severe gale may be expected. It is strongly recommended that they be promptly observed when made from the Port Office; and any neglect in the observation of, or departure from, the foregoing instructions, will be reported to the agents for Lloyd's, and to the owners.

GENERAL SIGNALS.

White pierced blue, over union-jack—Clear hawse, and prepare to veer cable.

Union-jack over white pierced blue—Veer to a whole cable, and see the third anchor clear.

Blue, white, blue, horizontal, over union-jack—Down top-gallant yards and masts, and point yards to the wind, and see everything clear for working ship as far as practicable.

Union-jack over blue, white, blue, horizontal—Strike lower yards and top-masts, and rig in jib-booms.

Union-jack over No. 3, white and red, vertical—Shorten in cable to same scope as when first moored.

When it is considered necessary to make any of the above signals, it is strongly recommended that all commanders immediately repair on board their respective vessels, and that the above signals may be answered by hoisting the answering pendant, or the ensign at the peak end or any of the mast-heads.

The above signals will be repeated from the Lion's Rump signal-station.

Vessels having Marryat's Code of Signals can make their wishes known to their agents in blowing weather through the Port Office; and any assistance required will be strictly attended to, as far as practicable; and vessels not having the code can make the following with their ensigns:—

1.—Ensign in the fore-topmast rigging—I am in want of a cable.
2.—Ensign in the main-topmast rigging—I am in want of an anchor.
3.—Ensign in the fore-rigging—I have parted a bower cable.
4.—Ensign in the main-rigging—I want an anchor and cable.
5.—Wheft where best seen—Send off a boat.

A *green* light is shown only during N.W. gales at the end of the old South jetty. Should vessels part from their anchors during a northerly gale, and cannot work out, it is strongly recommended to run for the light, and beach close to the southward of the Castle Ditch, the crews remaining by their vessels, by which means little or no danger of loss of life is to be apprehended. It is also recommended that, in the case of such vessels taking the ground, any after-sail that may have been set in running for the beach should immediately be taken in, keeping the foresail or fore-topsail set, as the case may be, until the vessel is firmly grounded.

The following signals may be made from the most convenient point to vessels that are stranded:—

In *day-time*, a number will be shown, white upon a black ground. At *night*, the number will be shown transparent.

No. 1.—You are earnestly requested to remain on board until assistance is sent; there is no danger to life.

No. 2.—Send a line on shore by cask, and look out for line from rocket or mortar.

No. 3.—Secure the rope; bend a warp or hawser to it, for us to haul it on shore for the boat, or for us to send you a stout rope, to be made fast to some firm part of the wreck, that we may haul off a boat for bringing you on shore.

No. 4.—Lifeboat will communicate at low water, or as soon as practicable.

No. 5.—Have good long lines ready for lifeboat, and prepare to leave your vessel; no baggage will be allowed in the lifeboat.

Answers to the foregoing Signals.

By *Day.*—A man will stand on the most conspicuous part of the vessel, and wave his hat three times over his head.

By *Night.*—A light will be shown over the side of the vessel, where best seen.

TIDES.—By observations in Table and Simon's Bays, it has been found that the mean interval between the moon's meridian passage and high water is $2^h\ 42^m$. Therefore the approximate time of high water on any given day is $2^h\ 42^m$ after the moon's passage; and it may be found by adding this time to the hour of the "Moon North," as given in any Cape Ephemeris. The rise and fall is from 5 to 6 ft., which is not exceeded, except under the influence of a heavy gale or hurricane. The time of high water and the range of tide is nearly the same on all the coast between Table Bay and Cape Agulhas.

CURRENT.—A current, varying in strength from half a knot to 2 or 3 knots, sets to the northward past Table Bay and Robben Island, but during the winter months, when N.W. winds prevail, a current sets into Table Bay from the N.N.W., and impinging on the S.E. shore of the bay, about Salt River, divides into two streams, the one setting northward along the coast, and out between Robben Island and the main land at Blaauwberg, while the other takes a westerly course as far as Cape Town Castle, then northerly, sweeping the S.W. shore of the bay, and carrying away loose soil from the South sides of the jetties and projecting rocky points. During the summer season it has been observed, particularly during south-easters, that a gentle stream sets round Mouillé Point to the S.S.E. into the bay, and out by the Blaauwberg Beach, as in the winter. The rocks about the beach from Green Point to the Amsterdam Battery are bare, and always free from sand; but in the depth of the bay, from the Castle to the Salt River, vast quantities of sand and seaweed are removed from the beach by the drawback of the rollers, and carried away by the current, leaving the sea-shore a platform of solid rock, which is again covered up to the depth of 2 to 3 ft. during the months of summer.

WINDS.—During summer (October to April) the prevailing winds in Table Bay are from the S.E. These winds, although known by the name of south-easters, blow at about S. by E., frequently with violence during the summer season, and more or less in every month of the year, generally bringing settled weather.

When Table Mountain, in the summer months, begins to be covered with a white cloud, it indicates a strong south-easter. In January, February, and March, these winds blow at times with great fury over Table and Devil Mountains, and through the gap between them, driving the white clouds in rolling fleeces like wool over the perpendicular sides of the mountain. On these occasions, vessels not well moored are liable to drive, and bring both anchors ahead. There have been instances of vessels driven from Table Bay by these south-easters with all their anchors down, and not regaining the anchorage for five or six days. When Table Mountain is free from clouds the south-easter will be moderate, and prevails on the eastern side of the bay only, while a gentle breeze blows in from sea on the western side of the bay.

The violent S.E. wind is to be guarded against in entering Table Bay, for it is not unusual for vessels, during its continuance, before arriving at Green Point, to have light breezes; and upon opening the bay to the S.E., and coming beyond the shelter of the Table Mountain and the Devil's Berg, to be obliged to let fly all sail to save their masts from the fierce south-easter, sweeping over the land into the bay; therefore, it is prudent to shorten sail in time to avoid accident, and the appearance of the Table Cloth may perhaps give some indication of what may be expected.

The so-called "black south-easter" blows from about S.S.W., and is distinguished from the regular south-easter by the nimbus or rain tint of the cloud on Table Mountain. It is frequently accompanied by light rain and cold weather. Black south-easters are very destructive to the vines, and to young vegetation; their appearance the next day being as if withered by frost.

During winter (May to September) north-westerly winds prevail. West and S.W. winds blow strong, attended often with fogs and cloudy weather, and frequently hail-storms with the S.W. wind; but the N.W. winds are most violent in those months, often blowing in severe storms at North or N.N.W. for several days, with a cloudy sky, and sometimes accompanied with rain. N.E. winds are less frequent than any other, and never continue long.

As seen from the Observatory, the first indication of a north-wester is the appearance of a mass of condensed vapour rolling over the Lion's Hill, and enveloping the Signal Station; also the air feels damp, and a swell sets into Table Bay; the tops of the ridges bordering the shore in the direction of Hout Bay become covered, and next, but not always, Table Mountain.

Strong wind, with squalls and showers more or less heavy, follow these harbingers, and the fogs which now cover the elevations are of the usual European cast. The phenomena which are characteristic of *warm dry* air being forced upwards by strong wind and again descending, are here entirely wanting. The duration of a north-wester fluctuates between two days and a week, sometimes ten days.

In calm weather low fogs occasionally occur, particularly in winter and autumn, the tops of the mountains and high hills being visible above the fog, which is afterwards dispersed by the heat of the sun.

The late Astronomer Royal, Sir Thomas Maclear, remarks on a tabular summary of the winds observed for 14 years, as follows:—

The direction of the wind was observed four times daily, from January 1st, 1842, until October 1st, 1851; afterwards five times daily, till January, 1856; but the totals cannot agree with this system, since "*calm*" has no direction.

The direction is almost exclusively from seaward, viz., from S.E. to N.N.E., through West. The register furnishes no instance of strong winds from the eastward, only a very light air (and that rarely) when the wind is changing.

The southerly winds are dry, strong, and occasionally violent. The south-westerly winds are in squalls, and generally accompanied, or followed, by rain or hail. The north-westerly winds are in general strong, sometimes violent, and almost invariably followed by rain. It is this wind which is dangerous to the shipping in Table Bay.

To the frequent winds may be attributed, in a great degree, the noted salubrity of the Cape climate, particularly the absence of those fevers of the bilious remitting type, which in many other countries are produced by marsh miasma, or continued calm and hot weather. The putrid exudations from the ground are scoured off—the unhealthiness which springs from inattention to domestic cleanliness is greatly diminished—and the depressing effect of summer heat is considerably reduced. The inhabitants, thus favoured, should not grumble at a little discomfort from shifting dust, nor regret that vegetation is not always green.

TABLE BAY TO THE CAPE POINT.—The distance between the lighthouse on Green Point and the southern extremity of the Cape, taken along shore, is about 32 miles. The form of the land between is altogether variegated and irregular, and will be best understood by reference to the chart.

From the westward the Cape Peninsula appears high and rugged from Table

Mountain to within 4 miles of the Cape of Good Hope, where the mountain chain terminates at Paulusberg, which stands over the North extreme of Buffels Bay, on the West side of the peninsula. From Paulusberg to Cape Point the land is elevated and even, with the exception of two peaks at its southern extremity, which, at a considerable distance, make like a saddle island.

At one-third of a mile South of Green Point is *Three Anchor Bay*, about one-eighth of a mile wide, and affording shelter to boats against S.E. or S.W. winds. There are two clusters of rocks, called the *Lion's Paws*, at half a mile from shore, off the Sugarloaf, or Lion's Head, 3 miles to the W.S.W. of the lighthouse, and to the northward of Camps Bay. Besides these there are other rocks along the coast, between Green Point and Duyker Point, which is generally foul.

Vessels should give the shore a berth of 3 or 4 miles in proceeding to and from Table Bay, for inside this distance the wind is baffling and light, from the close proximity of the high land.

From the western end of Table Mountain a high, serrated ridge of mountains, called the *Twelve Apostles*, extends in a S.W. by W. direction towards Hout Bay. They present a steep, precipitous face to seaward, and are terminated by a remarkable conical hill, similar in appearance to the Lion's Head, but not so high, called the Little Lion's Head, and having at its southern slope a very conspicuous white sand-patch. To the southward of this, about 1½ mile distant, rises a lofty, rugged hill, called *Suther Hill*, which is divided by a saddle ridge from *Captain Peak*, a remarkable hill, of considerably less elevation, overhanging, and to the westward of, Hout Bay.

DUYKER POINT (or *Chapman's Head*), which is the westernmost point of the Cape Peninsula, has some outlying dry rocks off it, and should be rounded with caution, and be given a berth of a mile. Here there is no bottom at 40 fathoms at 1½ mile from shore. Green Point light, bearing E. by N. ¾ N., clears this point at about that distance. Half a mile to the north-eastward of Duyker Point there is a dry ledge of rocks, which extends fully one-third of a mile from shore.

Vulcan Rock, the highest of a cluster, about 150 yards in extent, lies W. by N. ¾ N., 1½ mile from the North point of entrance to Hout Bay, and a mile from the shore. It is awash at high water, with 11 to 20 fathoms around it at 1 cable distant. Inside Vulcan Rock, and quite close to the shore, is *Duyker Island*—a low rock, with a shoal off it, the breakers extending halfway over to Vulcan Rock. The passage is therefore dangerous, but the *Abercrombie Robinson*, East Indiaman, passed inside the Vulcan Rock in 1831, with soundings from 8 to 13 fathoms; but this was a case of necessity, the vessel having drifted close to the rocks in a fog, and it may serve as a hint to any mariner who may be placed in a like extremity.

HOUT BAY.—A snug little cove, called Hout Bay (where the Dutch used to send ships to winter), lies to the eastward of Duyker Point, at 10½ miles to the southward of Table Bay, in lat. 34° 3½′ S. The entrance, which is open to the S.W., is 1 mile broad, with soundings of 19 to 12 fathoms, and, across it, a line of foam is frequently seen, giving a false appearance of danger. The upper part, to the North, is only three-quarters of a mile in extent, and has 5½, 5, 4, and 3 fathoms, fine sand; and here shelter may occasionally be found. The coast on each side is high and rugged, particularly on the East, which is an inaccessible, steep, rocky shore. The North shore is low, marshy, and divided by a stream of fresh water. The best way in is along the eastern shore: and having passed through the middle of the entrance, luff up under the West point, and there anchor. On this point, called *York Point*, are the ruins of a battery, within which is the landing. Over York Point is *Captain Peak*, a remarkably sharp, rugged hill, perpendicular on its southern face, and connected by a ridge to the N.W. with Suther Peak. On the opposite side is the remarkable peak, *Constantia Berg*, 3,200 ft. high; seen over high cliffs, and bearing E. ¾ S. (*E.N.E.*), it leads directly to the bay.

The finest garden ground in the neighbourhood of Cape Town is in the valley which runs down to the head of the bay, and a stream, the Hout River, flows through it. Fresh water is abundant, but not convenient to get on board, and the bay is scarcely ever visited by ships. Provisions can be obtained from Cape Town, and good fish is abundant. Coal cannot yet be obtained here, though the place appears to be admirably adapted for a coaling station. Although, at times, it may be difficult of entry for sailing vessels, owing to baffling winds, steamers can always enter with safety, as all dangers are visible, and, when inside, there is good anchorage in from 3 to 7 fathoms, sheltered from all winds.

It is to be remarked, that at 2 miles westward of the inner bay is the Vulcan Rock, before mentioned, which would be dangerous if it were not visible. Constantia Berg, in one with the southernmost point of the peninsula of Hout Bay, leads close to the southward of the rock; keeping Constantia Berg on the bearing of E. ¾ S., leads a mile to the South of it.

Slang Kop Point, or *Snake's Head*, is a headland 5 miles to the southwestward of Hout Bay. The coast between forms *Chapman Bay*, a sandy shore, entirely bordered by rocks. Over the North point of this bay is a dark, high peak, called Chapman Peak, useful as a mark in False Bay.

Immediately at the back of Slang Kop Point the cliffs rise to the height of 300 or 400 ft. above the sea. The point is low at the beach, and rocky, with a ledge of sunken reefs fringing the shore to the distance of 1¼ mile. The sea breaks over this rocky ledge only in westerly winds, when there is usually a heavy swell. From Slang Kop Point to the Kromme River, a distance of 5½ miles, in a southerly direction, the coast becomes higher and rugged; thence to the Cape of Good Hope it is elevated 300 to 400 ft. above the sea, and is tolerably regular in outline.

At 2½ miles southward of Kromme River is Olifants Bosh Point, off which, distant 5 cables W. by S., is *Albatross Rock*, with less than 6 ft. water on it, and 5 to 13 fathoms around. At 11 cables N.E. by N. ¼ N. from Albatross Rock, and nearly 4 cables from the shore, is a small rocky patch with less than 6 ft. water on it. The shore should not be closely approached, as other dangers may exist in this locality. At 1 mile westward of Albatross Rock the soundings increase to 27 to 30 fathoms, and continue about the same for 2¼ miles from the rock in the same direction.

The S.S. *Kaffir* was stated to have struck on a sunken rock 3 miles off shore, near Olifants Bosh Point, but on the locality being examined by Commander Wharton, H.M.S. *Fawn*, 1878, no indication of such a danger could be found, and the vessel probably struck on Albatross Rock, the outer part of which is 6 cables West of Olifants Bosh Point. The Cape of Good Hope light is obscured by intervening land between the bearings S.E. by S. ⅞ S. and S.E. by S. ¼ S. These bearings lead S.W. of Albatross Rock, from 1 mile to about one-third of a mile.

At 10 miles S. by W. ¼ W. from Slang Kop Point there is some shoal water, of 10½ fathoms least depth, extending 1¼ or 2 miles from the shore, which breaks in rough weather. From its shoalest part, which is on its outer extremity, the Cape of Good Hope lighthouse bears S.E. ½ S. 6 miles.

CAPE OF GOOD HOPE.—The southernmost extremity of the Cape of Good Hope is a precipitous cliff, surmounted by two sharp peaks, 1,800 yards apart, S.E. by S. ½ S. and N.W. by N. ½ N. The one to the N.W. is 880 ft. high, and called *Vasco de Gama;* the other is 800 ft. high, and surmounted by the lighthouse. The westernmost point was named after the late Astronomer Royal, *Cape Maclear*, and at a mile eastward of it, and joined to the lighthouse point by sunken rocks, is a small rock above water, about a cable's length from shore, and named *Dias Rock*. From Cape Maclear the S.W. Reef extends to sea, and all the coast between it and Slang Kop is bordered with rocks.

The *S.W. Reefs*, consisting of several 4 and 5 fathoms patches, generally break, and the outermost of them lies a mile out from Cape Maclear, in a W. by S. ⅜ S. direction. The Cape lighthouse bears E. ½ N., 1¾ mile from the outer patch.

CAPE LIGHTHOUSE.—The Cape of Good Hope lighthouse stands on Cape Point, the southernmost extremity of the Cape Peninsula, in lat. 34° 21′ 12″ S., long. 18° 29′ 30″ E. of Greenwich. It is of iron, 30 ft. high, and painted white. The light is a *revolving bright* light of the first order, from reflectors, which show a bright face for the space of 12 seconds once every minute It is visible all round the compass, except between the bearings from a ship of S.S.W. and S. ½ E., and between S.E. by S. ⅞ S. and S.E. by S. ¼ S., on which latter arc of 7° it is obscured by the intervention of Vasco de Gama Peak, rising 64 feet above the light. The light is elevated 816 ft. above the mean level of the sea, and, in clear weather, should be seen from a distance of about 36 miles. From its great elevation it is frequently obscured by mist; in one instance the sandy beach was seen by H.M.S. *Challenger* on a moonlight night, a quarter of an hour before the light was visible.

A *Signal Station* has been established on Cape Point, close to the lighthouse. By signalling, therefore, off Cape Point, vessels will be duly reported.

The Bellows, a large rock, even with the water's edge, lies with the South pitch of Cape Maclear, bearing North (*N.N.W. ½ W.*) 2 miles, and the Cape lighthouse N.E. by N. ¼ N., 2½ miles. From the rock, which always breaks, Muisen-berg, in the N.W. corner of False Bay, is shut in with the Cape Point, and Hang Klip, or the Peak of Cape False, bears nearly S.E. by E. ¾ E.

Anvil Rocks.—These rocks, three in number, covering an area of one-fifth of a mile, have 18 ft. water over them, except in one spot on the eastern ends which has only 6 ft. on it at low water spring tides. Breakers only show upon these rocks at low watcr with a heavy swell, and the soundings are from 14 to 18 fathoms close around them; much care is therefore requisite when approaching their vicinity. From the rock the lighthouse bears N.W. by N. ¾ N., 1⅜ mile; the Bellows Rock W. ¾ S. about 1¾ mile; and the Devil's Peak (Table Bay), is just open East of Muisen-berg, and Paulus-berg South Hill nearly

North, 7½ miles: the passage between Dias Rock and the Anvil but little exceeding 1 mile.

Three pinnacle rocks, with 4½ and 5 fathoms on them, lie between Dias Rock and Anvil Rock, rendering that passage unavailable for ships of large draught, or even for small vessels in bad weather. The inner danger, with 4¼ fathoms over it, and 10 fathoms all round, lies S.E. by S. ½ S., 3 cables from Dias Rock. The two outer rocks, having 5 fathoms over them, are about a quarter of a mile apart, with 16 fathoms between, and 10 fathoms all round. The western one lies S. by E., 8 cables, and the eastern S.E. by S. ¾ S., 9 cables, from Dias Rock, the latter danger bearing from Anvil Rock, N.W., distant about 3 cables.—*Lieut W. E. Archdeacon, R.N.*

Directions for making the Cape from the Westward.—Vessels approaching the Cape of Good Hope from the westward will, if the weather be clear, make the Cape Point light at the distance of about 36 miles, unless it should happen to bear between S.E. by S. ⅞ S. and S.E. by S. ¼ S., in which case it is invisible through an arc of the horizon of 7° (or a chord of 4½ miles) by the intervention of Vasco de Gama Peak. Caution is, therefore, necessary not to continue a course between these bearings when making the land at night, or in hazy weather, but to steer so as to cross the darkened region with as little delay as possible. By using this precaution, there is little danger to apprehend from the light not being visible over this small space. The southern limit passes more than a mile to the S.W. of Albatross Rock.

Should it, however, happen that a ship is found to be near the land at night, and the land not visible, she must be instantly steered to the S.W., until her position is ascertained by the light being seen. If a northerly course should be adopted under these circumstances, she might run on shore. A glance at the chart will enable this to be seen at once.

As the wind seldom, if ever, blows from the East or N.E. (*i.e.* directly off the peninsula), sailing vessels, bound either for Table Bay or round the Cape of Good Hope, should ensure a weatherly position to the North or South, according to the season of the year. Vessels for Simon's Bay have been detained for many days by south-easters off the Lion's Head and Hout Bay, in consequence of their making the land too far to the northward during the summer season. The same winds would have been fair for them had they been 30 miles farther South. On the other hand, a vessel bound for Table Bay in the winter season, will find difficulty in making her port from any position near Cape Point during the continuance of North and N.W. winds, notwithstanding the general prevalence of a N.N.W. current from the Cape of Good Hope.

Rounding the Cape from the Eastward.—Vessels from the eastward should not bring the Cape light to bear more westerly than N.W. ¼ W., which will clear all danger off Point Mudge and Cape Hangklip. A tongue of low land stretches from Cape Hangklip, in a S.W. ⅜ W. direction, for nearly 1¼ mile, rendering caution necessary in passing it in hazy weather, especially if bound into Simon's Bay. If bound for Table Bay from the eastward, vessels, after rounding the Cape of Good Hope, and passing Slang Kop Point, should not shut in the light with that point until the light on Green Point becomes visible, which will be on an E. by N. ¾ N. bearing. This course will lead about 2 miles to the westward of Vulcan Rock, which lies off the northern point of entrance to Hout Bay. A course for Table Bay may then be shaped with safety, as before directed.

Steam-vessels, in passing close round the Cape, have usually gone between Dias Rock and the Bellows and Anvil Rocks, especially if bound into Simon's Bay; but the *dangerous rocks* in the channel make this a hazardous course. The mark given to avoid the S.W. Reef, when nearing Cape Maclear, is, not to bring Bellows Rock to the southward of S.E. ½ S. until Dias Rock bears E. ¾ N., or until Cape Maclear is midway between Vasco de Gama Peak and a gap which separates the lighthouse from that peak; then steer so as to pass 1½ to 2 cables southward of Dias Rock. Should a vessel unfortunately strike on any of the outlying reefs, and become in a sinking state, there is a small sandy cove between the lighthouse and Cape Maclear, in which she may be beached with greater safety than on any other part of the adjacent coast.

FALSE BAY.—False Bay, as shown by the chart, is formed by the peninsula of Good Hope on the West side, and the land above Cape Hangklip and False Cape on the East. The distance between is 16¼ miles S.E. ¾ E. and N.W. ¾ W. It was surveyed in 1869 by Lieut. Archdeacon, R.N. Hangklip Cape has a steep bluff, resembling a quoin, which may be seen 24 miles off. Without the line of the two capes is a rocky bank, on which the soundings vary from 13 to 35 fathoms; it is about 2 miles over, and the shoalest water, which is on its N.E. end, is with the Cape lighthouse, N.W. by N. ½ N. 5 miles, and the peak of Cape Hangklip (False Cape Peak), E.S.E. Within this bank the depths are 40 and 45 fathoms; without it, 40 to 50 fathoms.

In the middle and eastern part of False Bay the ground is generally foul, and unfit for anchorage. On the western side, at 4¼ miles from shore, is Whittle Rock, formerly called Trident Rock, having only 7 ft. over it.

Whittle Rock rises on the South side of an extensive ledge of rocks, nearly a mile in circumference, which is steepest on the S.E. side. Another rock, of 4½ fathoms, lies South (by compass), 40 fathoms from the shoalest part of the Whittle, with 11½ and 11 fathoms between. On the shoalest part of the Whittle, the extent of which appears to be about 6 ft. in diameter, only 7 ft. of water was found at low spring tides. It seldom breaks, except with a heavy sea at low water. The ebb tide sets strongly to the S.S.W., and the flood to the S.E. over the ledge.

To the N.W. of the Whittle, at 220 yards distance, are other rocks, covered to the depth of 4 and 5 fathoms. Between the two rocks the depths are 11 and 11½ fathoms. A beacon was once placed on Whittle Rock, and subsequently a buoy was moored there, but the situation was so exposed that they could not be maintained.

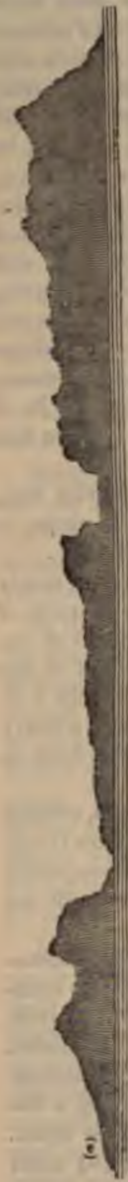
For the purpose of marking the exact position of Whittle Rock, *two beacons* have been erected at the back of Buffel's Bay, 3 miles North of the Cape lighthouse. The upper one, placed on the summit of the coast, is painted black, and can be seen as soon as the Cape is rounded. The lower beacon is painted white, on the slope of the hill, about a quarter of a mile N.N.E. of the landing-place in Buffel's Bay. These beacons each consist of a spar carrying a flat board at their summits, about 22 and 26 feet high, and 1,700 yards apart. When in line, bearing W. ¾ S., they lead on to the rock, which lies 6¼ miles from the outer beacon.

There is a white beacon, with staff and ball, behind the commandant's house at Simon's Bay; and 8½ cables from this inner white beacon is a beacon 35 ft. high, painted *white*, with a *red band*, and standing on a rock a few yards from the shore near Oatland Point. These bear, when in one, N.W. by N., and the junction of this bearing and that of the two beacons above named, marks the most dangerous summit on the Whittle Bank. The top of a hill bearing N.W. ¼ N. of the arsenal has been whitewashed, and previous to the establishment of the beacons this was the chief mark for avoiding the Whittle. There are two sand patches near the whitewashed mark similar to it; not being distinguishable in damp weather, it is not a very good mark. By keeping the beacons a point open of each other, either way, you will avoid the rocks.

The other marks for clearing the shoal are very remarkable in clear weather. The long mark is Chapman Peak, a high peaked hill over Hout Bay, just open to the West of Elsey Bay Peak, N. by W. ¼ W.; Roman Rocks lighthouse in line with Elsey Peak N. ¼ W. leads nearly midway between the rock and the shore, in from 27 to 22 fathoms.

It would be advisable for strangers, coming into Simon's Bay, after passing the Cape, to steer directly in for Paulus Berg, keeping up the western shore at any convenient distance, until they open the sandhills in Simon's Bay. The highest sandhill appears like a road over the mountain. Just opening Blockhouse Point is likewise a good mark for clearing the Whittle, and for running into the bay.

A ship from the southward, on approaching False Bay, will descry the ridge of rugged mountains that terminate in Table Bay. In clear weather, the Table Mountain may be distinguished at the distance of 60 miles. On the eastern side of False Bay, from the pitch of Cape False, northward, another ridge of mountains extends to the bottom of the bay, and thence to the north-eastward. The interval between the high lands on the two sides of the bay is low and level; and some mountains, which may be seen over it, are at a great distance up the country. Cape Hangklip, on the eastern side, so much resembles a gun-quoin, that it cannot be mistaken.



Appearance of the Cape of Good Hope, (a) Cape Point N. by W. ¼ W., distant 30 miles.

(a)

On coming into the bay from the westward, with a N.W. wind, a ship may pass to the southward and eastward of the Bellows and Anvil, at the distance of 2 miles, or according to circumstances. From abreast of the Bellows, at 2 or 3 miles, haul up no higher than E.S.E. or E. by S., until you have run 5 or 6 miles in this direction, whence you may steer to the E.N.E. and N.E. till the Cape bears W.N.W., and you will be clear of the sunken rocks. In advancing thus, you may always gain a proper anchoring ground, in case of a calm, or unforeseen shifting of the wind.

On the western shore of False Bay, nearly 3 miles to the northward of Cape Point is *Buffel's Bay*, a small indentation in the coast line, marked by a white sand-patch. The depth of water is 4 or 5 fathoms, near the shore, and in a N.W. breeze a vessel may anchor off it in 8 to 10 fathoms; if unable to beat to windward, this is preferable to going to sea. There is a fishing establishment and a landing-place in the bay.

Ships may anchor in 26 fathoms, sandy bottom, with the Cape lighthouse S. by W. ½ W. and Paulus Berg East, southerly, distant 1½ mile from shore. Here it will be smooth in a north-wester, and if a south-easter comes on, you will have room to weigh, cast, and run up to Simon's Bay. Ships have ridden out strong south-easters at anchor off Buffel's Bay, but with considerable risk. Between Buffel's Bay and Smithwinkle Bay, 3½ miles farther North, the shore is overlooked by four sharp peaks. Off both points of Smithwinkle Bay, rocks, some of which are above water, project from shore. The southern point must have a berth of at least three-quarters of a mile; Miller Point is also foul.

Rockland Point is about 7 miles from Cape Point, and 4 miles from Roman Rock lighthouse. It is the most prominent point, and under the highest land, between the Cape and Simon's Bay. The point runs off to a ledge of dry rock, beyond which there is an isolated rock 2 cables to the south-eastward. This outer rock, which is about 9 ft. above high water mark, has 11 fathoms water close outside it, and may, therefore, be passed as close as convenient. Inside this rock the soundings are 7 fathoms until within a few yards of the point.

Off this coast, for the distance of half a mile to the South of Rockland Point, some isolated rocks lie off shore, so that a berth of at least three-quarters of a mile should be given. Next to Rockland Point, and distant from it 1½ mile, come Oatland Point and beacon, with a few rocks off it.

From Smithwinke Bay to Rockland Point the coast is lofty, the hills rising to a height of 2,200 ft., almost abruptly from the sea. To the northward of Rockland the hills recede a little from the sea. The depth of water along this coast, at the distance of a mile, appears to be from 20 to 25 fathoms.

Noah's Ark, a flat-topped rock, about 100 ft. long by 30 ft. high, is situated S.E. ½ E., 5 cables from Blockhouse Point, the southern point of Simon's Bay; it is 3 cables from shore, and about a mile to the northward of Oatland Point. From it, in a N.N.W. direction, to the distance of 3½ cables, the ground is shallow and foul, having on it *Nimrod Rock*, in 8 ft. water, and terminating with *Phœnix Rock*, which has but 3 ft. water over it. This latter danger is marked by a beacon, lying N.N.W. half a cable from it, with the word "Rock" painted on its flag. The water is deep close round Noah's Ark, save on the N.E. side, where, at 30 yards off, there is 2½ fathoms; but it may be approached within a ship's length. The passage inside Noah's Ark should on no account be attempted.

Maidstone Rock, with 22 ft. on it at low-water springs, bears S.E. ½ E., 2 cables from the S.W. end of Noah's Ark, and rises to a sharp peak, the summit of which is so small that it is difficult to keep the lead on it.

The cross bearings for Maidstone Rock are the S.W. end of Noah's Ark on with the North corner of a (Mount Curtis) garden-wall, N.W. ½ W.; a remarkable round rock on the beach on with Anderson's Cottage; also Roman Rocks a sail's breadth open of the foot of Muysen Berg. This rock was discovered by a fishing boat of H.M.S. *Maidstone*, in February, 1830.

A vessel of heavy draught in approaching Maidstone Rock, should not pass within a line drawn from Oatland Point beacon to Roman Rocks lighthouse bearing N.E. by N. ¾ N., which will lead about three-quarters of a cable outside a 29 ft. patch, lying 1 cable S.E. by S. ½ S. from Maidstone Rock, and 1½ cable clear of the rock itself, until the Admiral's house appear its breadth open of Noah's Ark.

SIMON'S BAY.—Eleven miles to the northward of the Cape Point, within False Bay, and at the foot of the highest mountain on the coast, lies Simon's Bay, into which you may put, in the months of May, June, July, and August, or when other circumstances render it necessary. Though this place is not more than a large cove, sheltered only from the winds between the North and S.E. coming by the West, yet those of the other quarters, which come from the bottom of the bay, or from the mountains bordering the coast, never blow there so strong as to endanger the shipping; so that it may be looked upon as a safe retreat, wherein you may lie sheltered from all winds; besides, at Simon's Bay, you meet with all the supplies which a vessel may need after a long run, or in case of damage to her rigging. There is also a patent slip fit for vessels of 1,300 tons, that can be lightened to a draught of 14 feet.

The shores of the bay may be approached all round to within 2 cables, and the closer a vessel lies to the patent slip and hospital, the more sheltered she will be in S.E. winds; but in bringing up care is required not to foul the several pairs of moorings laid down for men-of-war. If, therefore, it is purposed taking an inshore berth, it is better to bring up on the S.E. side of the bay, well under Blockhouse Point, on which stands a fort and round white tower, at one third of a mile from the sea. *Wharf Rock*, having 9 ft. of water over it, lies 260 yards E.N.E. of Simon's Town jetty, and is marked by a buoy.

Supplies are procurable at this place, and if more are required they can be had from Cape Town, the road from which has been much improved. The water is excellent. For men-of-war it is brought alongside in a tank-vessel, containing about 70 tons. There is a smaller tank-vessel for merchant ships, containing about 5 tons, but the dockyard tank is often lent to water merchant ships on application. Coal may be had and is supplied in boats holding about 8 tons. Fish is abundant in the bay, and the beaches are good for hauling the seine.*

Anchorage.—A good berth for a large ship in Simon's Bay is about half a mile off shore, in 9½ to 10 fathoms, with Noah's Ark S.E. ¾ S., and the clock tower in the naval yard W. by S. ½ S. Vessels moor N.W. and S.E., open hawse to westward and the longest scope of cable to the N.W. from May to September, for this being the winter season, the winds prevail from that quarter, and often blow in strong gusts over the hills. From September to May, the S.E. and South winds may be expected to predominate; then the starboard anchor should lie to the S.E.

The country being mountainous, little or nothing is produced here, and there are few houses, exclusive of the public buildings; these compose the arsenal and dockyard; one of them has a clock. There is an electric telegraph to Cape Town, and a railway will probably be constructed.

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* *Caution.*—There is a fish in Simon's Bay commonly called toad-fish. It is about 6 inches long; back dark, with deep black stripes; belly white, with faint yellow patches; it swims near the surface, and is a constant attendant on lines employed fishing. When taken from the water it puffs out considerably. Should any portion of the fish be eaten, death ensues in a few minutes.—*Lieut. Jamieson.*

Time Signal.—A circular disc, attached to a lever, working on a mast, has been established close to Simon's Town telegraph office, for the purpose of giving to vessels in Simon's Bay the instant of 1^h p.m. Cape Observatory mean time. At 55 minutes past noon the disc is raised to a right angle with the mast, and it falls at the instant of 1^h p.m. The position of the Time Signal is lat. 34° 11′ 30″ S., long. 18° 25′ 48″ or $1^h\ 13^m\ 43{\cdot}8^s$ East of Greenwich, and it is 11·8 seconds East of the Cape Observatory. The signal sometimes fails, and the ball is then kept up till 2^h p.m., when it is slowly lowered.

Iron and other vessels desirous of testing their compasses, will find it convenient to use a conspicuous sharp peak near Cape Hangklip, instead of having a person on shore taking simultaneous observations. The true bearing of this peak from the anchorage is South 71° 0′ 42″ E.; and as the peak is 24 miles distant, the bearing will not be materially affected by the change of position of the vessel in any part of the anchorage.—*Sir Thomas Maclear.*

ROMAN ROCKS.—These are a cluster, one of which is out of water, the rest awash, surrounded by foul rocky ground, occupying an extent of three-tenths of a mile radius from the centre one.

LIGHTHOUSE.—The light-tower on these rocks is circular, of iron, and 48 ft. high, painted in broad horizontal bands of red and white, in order that it may readily be seen against the background of sand. It stands N.E. by E. three-quarters of a mile from Noah's Ark, and E. by S. 1¾ mile from the Dockyard clock tower, and exhibits a *revolving bright* light, which shows a bright face for the space of 12 seconds every *half minute.* It is shown at 54 ft. above the mean level of the sea, and in clear weather should be seen at a distance of 12 miles. Being in a very exposed situation, it has been said to be unsafe.

Castor Rock is detached from the Roman Rocks cluster, and lies N.E. by N. ¼ N. 1¾ cable from the light-tower. It has only 15 ft. of water on it; its position is marked by a beacon, with a flag attached, moored 67 yards N.E. of the rock, having the word "Rock," painted on it. Between the rock and the lighthouse there are patches of 19 and 24 ft. water.

Seal Island is a low rocky islet, 2 cables in length, North and South, and 1 cable wide. It lies E. ½ S. 6½ miles from Roman Rocks lighthouse, and is surrounded by sunken rocks, upon which the sea usually breaks. Landing is difficult, except in very smooth water. This island abounds in guano, and is the resort of penguins, whose eggs may be collected in considerable numbers at the proper season.

York Shoal, the nearest part of which lies S. ¼ W. 1 mile from Seal Island, is a large rocky patch, with from 1 to 4½ fathoms on it, extending about 4 cables N. by E. ½ E. and S. by W. ½ W., and 1½ cable wide. It generally breaks.

East Shoal is a rocky patch with from 4 to 8 fathoms over it, excepting in one small spot near the middle, that nearly dries at low water springs, and on which the sea always breaks. The shoal is about half a mile long N.E. by E. and S.W. by W., and a quarter of a mile broad. From the shoal spot, Seal Island bears N.W. ½ W. 3½ miles.

Another shoal, with 6¼ fathoms water over it, bearing S.E. by E. ¾ E 6 miles from the East Shoal, sometimes breaks. To the W.S.W., 1 mile from it, is a shoal patch of 9 and 10 fathoms.

DIRECTIONS.—In a vessel from the westward bound for Simon's Bay, after rounding the Cape of Good Hope, and being past the Bellows Rock a half a mile distance, keep on to the East till Vasco de Gama Peak comes open to the eastward of the Lighthouse Hill, or until Constantia Berg comes well in sight over Rockland Point bearing about N. ¾ E., when you will be eastward of Anvil Rocks, and may steer in N.N.E., a course midway between Whittle Rock and the shore; when Elsey Peak is in line with Roman Rocks lighthouse N. ¼ W., steer for it, altering course when within a mile of the lighthouse so as to pass midway between it and Noah's Ark; and when the blockhouse on Blockhouse Point bears W. by S., the vessel will be well clear of Nimrod and Phœnix Rocks, and may haul into the bay, taking however, sufficient sweep so as to have time to choose a berth and room for rounding to.

The Roman Rock light should not be brought at any time to bear to the eastward of North, on account of the rocks off the western shore.

The following directions are also recommended:—After rounding the cape, shape a course to pass Miller Point at from 1 to 2 miles distance, taking care not to bring the Cape lighthouse to the westward of S.W. ½ W., or the Roman Rock lighthouse to the westward of N. by W. ½ W., until past the Whittle. You may then shape your course to round Noah's Ark at a cable's distance or more, taking care (if a large ship) to open Blockhouse Point to the northward of Noah's Ark before getting within a quarter of a mile of the latter, so as to pass outside Maidstone Rock. When past Noah's Ark, do not bring it to the eastward of S. by E. until the Blockhouse bears W. by S.

If the vessel is to work up to the eastward of the Whittle, Roman Rock light should not be brought to the North of N.W. by N. ½ N., in order to avoid that rock; nor to the westward of N.W. by W. ½ W., so as to give a sufficient berth to Seal Island and the shoals near it. But by whichever of those channels a ship approaches, short tacks should be made until certain of being within 5 miles of the light.

With a leading wind, the Roman Rock light may be brought to bear N. by W., which will clear the Whittle; and that course should be continued till within a mile of the light. The light must then be well opened on the port bow, so as to round it at not less than half a mile distance to avoid Castor Rock. When the light has been brought to bear S.S.W., steer in West for the anchorage, and bring up in 14 to 10 fathoms, according to the weather.

Vessels from the eastward should not bring the light to bear more westerly than N.W. ½ W., by which they will clear all danger off Cape Hangklip.

The common channel for ships entering Simon's Bay is between Noah's Ark and Roman Rocks, a width of seven-tenths of a mile; but if the wind be N.W., with a sailing vessel, the passage East and North of Roman Rocks must be taken, as it affords better working space.

Ships bound for Simon's Bay have frequently mistaken Muizenberg, a mountain 1,651 ft. high, which rises from the shore at the N.W. corner of False Bay, for the high hill over the South side of Simon's Bay, and have, in consequence, been stranded on Muizenberg Beach, the lowness of which coupled with the dazzling colour of the sand of which it is composed, causing it to be of a similar appearance to the surrounding water. To prevent this mistake, it must be borne in mind that the first or westernmost patch of white sand, extending high up the hills, is situated to the northward of Simon's Bay. The sand patches, four in number, are conspicuous even at night, and in steering for Simon's Bay they will be ahead, and on the *starboard* bow; whereas, if the vessel is steering for Muizenberg Beach, they will all be on the port bow. These remarks may appear unnecessary with the light on the Roman Rocks; but, notwithstanding this, several ships have made the mistake; one ran on shore, and several others were only saved by anchoring close to the beach, from which they were rescued by assistance from Simon's Bay. It should be remembered that, with the exception of the sand patch over Buffel's Bay, these are the only sand patches on the West side of False Bay.

Observe, also, that the soundings westward of Seal Island for 1½ mile are 15 and 15½ fathoms, rock, gravel, and bits of shells; and from thence to Elsey Bay 14 and 14½ fathoms, clean white sand (the sand is not so white and clean in any other part of the bay); therefore, in thick weather, should you get so far into the bay as to have 14 fathoms clean white sand, or 15 fathoms rock, gravel, and bits of shells, you should immediately steer to the westward, or anchor according to circumstances.

If apprehensive of being near the Whittle in thick weather, it may be of service to know that on its S.E., South, and S.W. sides, at half a mile distance, the soundings are 22 and 23 fathoms, large bits of whitish shell without any sand: the same bottom, in 24 and 25 fathoms, will be found in some other places in the vicinity of this rock, but in no other part of the bay are there such soundings.

At Night.—Rounding the Cape when bound to Simon's Bay, it is not easy to judge your distance so as to give the Bellows and Anvil a good berth. Perhaps the best way is to observe the angle of elevation of the light above the horizon, and so calculate your distance or take it from the traverse table, the light being 816 ft. above the sea.

Caution is necessary in misty weather against the possibility of mistaking the light on Roman Rocks for the light on Cape Point, as they are both *revolving*, and only 10½ miles apart. The distinction consists in the difference of interval of revolution, the light on Cape Point showing its bright face *every minute*, and the light on Roman Rocks *every half minute*.

When to the eastward and northward of the Anvil, shape a course to the northward, so as to bring the Cape light to bear S.W. ¼ S., and run from it on that bearing until the Roman Rock light bears N. ¾ W., then steer N. ¾ W., altering course a little to the eastward on approaching within a couple of miles of the Roman Rock light, so as to open it on the port bow, and proceed as before directed. Unless thoroughly acquainted with the navigation, and favoured with moonlight, ships, at night, should always pass to the eastward or northward of Roman Rocks.

Vessels coming inside the Whittle should keep the light on Cape Point between S.W. by S. ½ S. and S.W. ¾ W., until the Roman Rock light bears between North and N. by W. ½ W., when they may haul towards it. These limits leave the rocks off Miller Point, on the one hand, and the Whittle Bank on the other, half a mile distant.

Eastward of the Whittle.—Observe that the Whittle is nearly in a straight line between Hangklip and Simon's Bay. Running into Simon's Bay, do not bring the Cape light to the southward of W.S.W., until the Roman Rock light is between the bearings of N.W. by N. ½ N. and N.W. by W. ½ W., between which bearings you are clear of the Whittle on the one hand, and the York Shoal on the other. If working in, you should make short tacks between the above bearings of the Roman Rock light until certain of being within 5 miles of it.

By day, Chapman Peak touching the western edge of the sand in Fish-hook Bay, leads two-thirds of a mile to the eastward of the Whittle.

Vessels bound to the eastward should leave the bay when north-westers begin to blow; if bound westward in the winter season, they ought to remain till these winds are on the decline, and get under way when they shift to West, as it is probable they will veer from West to S.W., South, and S.E., which will be favourable for doubling the Cape.

Running for Simon's Bay in a South-easter.—It is not advisable in a strong south-easter to run for Simon's Bay at night, for the gusts of wind are violent, and there is a risk in bringing up; whereas, if you wait off the Cape under low sail till daylight, you will get into Simon's Bay by 7 or 8 a.m. without risk.

It has been recommended, when entering Simon's Bay, in a heavy south-easter, that ships should pass outside Roman Rocks, so as to have more room for rounding-to; but as by this means you come in the last mile with a beam wind, there is a risk of losing sails or spars unless close reefed. It is perhaps better to come in between the Roman Rocks and Noah's Ark, shortening sail so as to have all furled when abreast of Noah's Ark, and to round-to under the spanker only. The sheet cable should invariably be bent, and the anchor clear, when entering False Bay in a south-easter.

In Simon's Bay 13 or 14 sail of ships may lie moored in safety. The new moon makes high water here at $2^h 44^m$. The tide seldom rises more than 5 ft., except after a storm, or some other circumstance. There is little current to be perceived in the bay; the soundings are also regular, with a clear sandy bottom.

Winds.—From October to April, south-easterly winds generally prevail, but do not continue longer than five or eight days at a time, and are succeeded by variable winds. In Simon's Bay, as in False Bay, it frequently happens that these winds, after blowing very hard for a day and part of the night, abate towards morning, and are succeeded by a land breeze from the W.N.W. By taking advantage of this, and weighing with the first of the breeze, a vessel may sometimes get to sea before the return of the south-easterly wind. If unable to accomplish this, the most prudent plan will be to return to the anchorage in Simon's Bay.

In the south-east season these winds blow frequently and with violence at S.S.E. ½ E., making landing in boats disagreeable and at times almost impracticable without sail, when very low canvas is recommended. It is often found that, when blowing hard from the S.E. in False Bay, there is a gentle breeze from the N.W. in Table Bay.

From May to October north-westerly winds are most prevalent, with frequent gales and rain from that quarter. These gales occur, at times, all the year round, but they are rare in the S.E. season. The wind scarcely ever blows from the N.E., and never with violence. The S.W. wind (commonly called the kloof wind) is cold and frequently rainy. During winds from off the land no boats should sail in the bay on account of the sudden, violent, and variable squalls which blow down from the hills.

If the barometer stands at 30·2 to 30·3, and falls suddenly to 30·0 or 29·95, in nine cases out of ten it will blow a strong S.S.E. gale. The Muizenberg, capped with white cloud, is the precursor of a S.E. wind; and if the Hottentot Holland range on the East side of False Bay is also capped, the south-easter will probably be violent and of long continuance. When Simòn's Berg has a misty cloud on its summit, rain may be expected within an hour or two.

Elsey Bay, 1½ mile North of Simon's Bay, is merely a slight indentation of the coast without any shelter. Its North point is *Point Elsey*, high and rocky, with *Elsey Peak*, 1,200 ft. high, at the back of it. *Fish Hook Bay*, another slender bay, without shelter, lies to the North of this. Adjoining is *Kalk Bay*, a whaling and fishing station, with the only good landing on this shore, which may become hereafter of importance in the communication with Cape Town.

The *Muizenberg*, a mountain about 1,651 ft. high, lies to the northward of Fish Hook Bay, and in the N.W. corner of False Bay. To the eastward of its base the northern shores of the bay are sandy and low, continuing so for 18 miles. The shore has generally a very heavy sea breaking on it, and in some parts there are rocks a short distance from the shore.

The whole of the land at the bottom of False Bay is very low, and consists of sandy downs. At the foot of the high lands, East and West of the bay, are some marshes and lakes, fed by numerous streams which fall down their slopes. The two principal of these rivers are the *Grootezeekoe*, which forms a lake, one arm of which passes to the village of *Constantia;* and to the East the *Stellenbosch*, or *Eerste River*, passes the village of Eerste, lying 2½ miles inland, 1½ mile North from which is a station on the Wellington Railway. The *Strand*, a fishing station and boat harbour, is in the N.E. corner of False Bay, and is connected by a road with Somerset West, 2 miles in the interior.

Gordon's Bay, in the N.E. corner of False Bay, 2½ miles South of the Strand, affords good shelter against all winds from the North to the S.W. by the East, but it is exposed to those from N.W., which are violent in winter. The North side of the bay is sandy, and here is a small beach in front of some houses, where you may land, but it is very much exposed, there usually being a heavy surf on the beach. The depth gradually diminishes from 10 fathoms to 2 fathoms near the shore, and in the former depth H.M.S. *Boscawen* anchored in December, 1857, with the South point of the bay, S.W. ¾ W., and the Cape Point, W. ½ S., in good holding ground, with the wind at S.W and a heavy swell, lying broadside on, with a slack cable.

Paulus Berg, a conical peak, 3,800 ft. high, forming part of the chain the Bergen-van-Drakenstein, lies to the East of the bay. From the point of Gordon's Bay, the East side of False Bay consists of a bold coast, surmounted by high lands. It forms a slender, exposed bay, *Colebrook Bay*, with a sandy beach; and 2½ miles from Cape Hangklip is *Pringle Bay*, a mile wide, rocky, unfrequented, and without resources. A rivulet falls into its N.E. angle. To the S.E. of the bay rises Hangklip Peak.

CAPE HANGKLIP, or FALSE CAPE.—The latter gives the name to False Bay. The former is derived from a quoin-shaped hill, 1,448 ft. high, nearly 1½ mile N.E. from its extremity, which overhanging its base when viewed from the southward, is called *Hangklip*, or the hanging rock. It is the eastern limit of False Bay, and makes like an island when approached from the southward. A conspicuous sand patch extends halfway up its south-eastern side. Cape Hangklip is a low projection, on which the sea always beats heavily; a sunken rock lies three-quarters of a mile N.W. ¾ N. from it, and one-third of a mile off-shore, joined to the cape by shoal water, and therefore the cape should not be made too free with.

At 1½ mile to the eastward of Cape Hangklip there is another low rocky projection, with numerous outlying rocks to the distance of one-quarter of a mile; and from this the rocky coast extends easterly for 7½ miles to the *Palmiet River*, a rapid stream at times, but the entrance of which is always blocked with sand. At three-quarters of a mile eastward of this is a small cove, where boats may land at high water in fine weather.

At the back of this coast is a chain of mountains, which commences at 5 miles from Cape Hangklip, in two peaks of 2,780 ft. in height, and extends far to the eastward.

Sandown Bay is merely a sandy beach, nearly straight, which extends for 6 miles in a S.E. direction to Point Mudge, in the middle of which the *River Bot* find its way through the strand to the sea. At the southern end of this beach is a fishing station, where the boat from the unfortunate *Birkenhead* landed after the wreck. There is better landing in *D' Urban Cove*, in S.E. winds and fine weather, at the extremity of Point Mudge, formed by many sunken rocks and masses of kelp.

Point Mudge is low and rocky, and must not be passed too closely, as dangerous rocks and shoal water extend for half a mile to the S.W. of it. Like other capes in this vicinity, the high land is at some distance within it, which should be considered at night time. *Onrust Berg*, the western end of the coast range, is a square bluff of 1,575 ft. elevation, with a conspicuous pile on its summit, 1⅔ mile from the extremity of the cape.

WALKER BAY.—From Point Mudge the coast takes a S.E. direction for 4½ miles to *Shell-lime Point*, and then forms Walker Bay, which has Point Danger at its southern extreme. The bay is remarkable for its immense tracts of sand and high sand-hills at its head, which are visible at a long distance at sea, and give a distinctive character to the land, which would have been aptly expressed by the name Sandown. One pyramid sand-hill midway along the bay is 427 ft. high. A long heavy swell rolls into the bay, and the water is deep within 1 or 2 miles of the shore.

Kleine River, in the northern bight of Walker Bay, is a stream of considerable size inland, but its mouth is choked with sand.

Stanford Cove, a small rocky inlet, similar to D'Urban Cove, before described, also affords landing in East and S.E. winds. It is in the rocky southern shore of Walker Bay, 5 miles N.E. of Point Danger. There are several rocky patches off it, which, with the heavy swell, render it less available than Hydra Bay. There is plenty of good water near Stanford Cove.

Hydra Bay, 2 miles to the N.E. of Point Danger, is the best anchorage under that point, as further in the swell is heavier. The bay is easily distinguished by a sand patch, which marks the face of the hillock over it.

If coming in from the S.W. to anchor in Hydra Bay, the pitch of Point Danger should not be approached nearer than 2 or 3 miles; the bluff hill of Point Mudge may be steered for until the sand patch is well open, when the rocky spit projecting from Danger Point will be cleared. Then haul up for the bay, and anchor in 12 or 14 fathoms, about three-quarters of a mile from the shore, taking care to give a 3-fathoms rocky patch in the centre of the bay, upon which the sea often breaks, a wide berth. To clear this rocky patch, keep the low part of Danger Point open of the points of coast which are between it and the anchorage. H.M.S. *Hydra* anchored in 12 fathoms, with Duinfonteinberg pile E.S.E. southerly; extreme of Danger Point S.W. by W. ½ W.; and the sand patch in Hydra Bay, S.E. by S. ½ S. southerly.

Tides.—The rise of the tide (about 5 ft.) and the establishment ($2^h 44^m$) at Simon's Bay, Dyer Island, and Struys Bay, are very nearly the same, and the stream of tide along the whole coast between Cape Hangklip and Struys Bay is inconsiderable and uncertain.

Indraught.—In September, 1879, the SS. *Natal* experienced an easterly set of 4 miles in 2½ hours on her passage between Hangklip and Danger Points, the wind being westerly. Captain Gilbert, of the same steamer, in May, with a smooth sea and no wind, was also set nearly 4 miles to the eastward in 1½ hour, when passing between Danger and Quoin Points. The vessel was distant 4 miles in both cases from Cape Hangklip and Danger Point respectively. Great caution should therefore be used when navigating on this part of the coast, as the wreck of the *Birkenhead* and other vessels may have been owing to this occasional indraught to the E.S.E.

DANGER POINT, S.E. by S. ½ S., nearly 27 miles from Cape Hangklip, was formerly called Bluff Point, but very improperly, as the high land, as before mentioned, is 4½ miles within it. It is a tongue of low hummock land covered with bushes and stunted trees, projecting into the sea about 4½ miles from the base of Duinfonteinberg, a conspicuous and remarkable bluff hill from every point of view at sea. This point affords shelter from the S.E. gales of summer to ships of any size. The soundings are irregular off Danger Point. If approaching it at night, do not go into less than 35 or 40 fathoms; that is 5 or 6 miles off the point.

BIRKENHEAD ROCK.—Several detached sunken rocks are met with off this part of the coast, the most dangerous of which lies about a mile from the pitch of Danger Point, with 12 ft. of water on it.* There is a clear channel between the Birkenhead Rock and the reef of sunken rocks stretching out from the western angle of Point Danger. The sea breaks with great violence on the rock, but often only at intervals of about a quarter of an hour.

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* This rock is memorable as the scene of the terrible wreck of H.M. steam troop-ship *Birkenhead*, at 2 a.m. of February 26th, 1852. She left England with troops for the Kaffir war, then being vigorously carried on, with 630 souls on board, and reached Simon's Bay on February 23rd, after a passage of 47 days. Leaving this anchorage in the evening, she struck the following morning on the rocks off Point Danger, while going full speed, and in less than twenty minutes not a particle of her was visible. The vessel instantly broke up, and 438 of the officers, seamen, soldiers, and boys, out of the 630 persons on board, perished.—"United Service Gazette," April, 1852.

In the N.W. corner of the bay, formed on the south-eastern side of Point Danger, is the mouth of *Uilkraal River*, a small stream, choked at its junction with the sea by sand.

DYER ISLAND, S.E. by S. 6½ miles from Point Danger, is a low rocky islet, visible but a short distance at sea. In its centre and higher parts a little spinach grows, and it is the abode of numerous rabbits (similar to the English), gulls, cormorants, pelicans, and penguins. Guano is found on the island. *Geyser Island*, one-quarter of a mile S.W. by S. of Dyer Island, is smaller and somewhat higher, and the resort, in certain seasons, of seals, for killing which there was formerly a permanent establishment on Dyer Island. These islands, together with the numerous rocks, extending nearly 1½ mile to the westward of them, form a natural breakwater, under which vessels of any size may find shelter in South and S.E. gales.

Landing is not good, and at times impracticable. The best is near a small staff and shed, the marks of a disused sealing station.

Anchorage.—Dyer and Geyser Islands, being low and white, are made out with difficulty when seen against the sand-hills on the adjacent coast. In approaching them from the southward, the danger to be avoided is the reef of sunken rocks stretching to the westward from the islands, upon which several of H.M. ships have struck, and which is most dangerous in fine weather, when the sea does not break. It will be cleared by keeping the extreme of Point Danger on with the valley in the high land near Cape Hangklip, until the highest part of Geyser Island is in line with the Quoin. Then haul up for Duinfonteinberg (the bluff hill behind Point Danger), and when the Quoin is open North of Dyer Island, steer for the Quoin, and anchor in 10 to 12 fathoms, with the extremes of Dyer Island bearing about S.S.E. and S. by W.; Duinfonteinberg Pile, N. by E. ¼ E.; extreme of Danger Point. N.W. ¾ N.; and Gunner's Quoin Pile, S.E., southerly. The bottom is sand, and the holding ground good, but the reef affords no shelter from S.W. winds, and the anchorage is safe only as long as the wind is not to the westward of S.S.W.

There is a narrow channel, with a depth of 3 fathoms between the East end of Dyer Island and the rock above water in shore, which a small vessel might find practicable under favourable circumstances, but it cannot be recommended and the sea breaks quite across it in S.E. or southerly winds.

Coast.- From Danger Point to *Quoin Point*, a distance of 19 miles S.E. by S., the coast is low near the sea, and backed by bare rugged hills, of moderate elevation, one of which, called *False Quoin*, from its shape, is 888 ft., high, and about halfway between Danger and Quoin Points. A long, heavy swell constantly breaks on the shore, which is inaccessible.

About halfway between Dyer Island and Quoin Point are two rocky patches, 1½ mile off shore, upon which the least water found was 4 fathoms. The sea breaks upon them when there is any swell.

GUNNER'S QUOIN (called by the Dutch *Buffeljagtberg*) is a conspicuous, bluff hill, 997 ft. in height, named from its resembance to a quoin, which, however, it does not bear when viewed from the westward.

Quoin Point is a square projection of hummocky land, from the base of the

Gunner's Quoin, and is 3 miles from it. It is fronted by sunken rocks to the distance of 1¼ mile from the shore, and is distinguished, when seen from the southward, by two sand-hills near its extremity.*

From Quoin Point to Cape Agulhas, S.E. ½ E., 18 miles, the coast is low and sandy, except abreast of the flat-topped range of *Zoet Anysberg* (872 ft.), where the shore is steep and rocky. The whole of it is exposed to the full force of the ocean swell, and landing upon it is impossible. The soundings are shoaler along this part of the coast than they are off, and to the westward of, the Quoin; and between 1¾ and 3¾ miles eastward of the S.E. face of Quoin Point, and nearly 1¾ mile from the shore are several rocky patches covered and uncovered. In standing towards any part of this coast Cape Agulhas light should not be lost sight of, and a vessel should stand off before the light disappears on a S.E. by E. bearing.

H.M.S. *Hydra* found tolerable shelter and smooth water, in a strong N.W. wind, at anchor under the lee of the reefs to the eastward of Quoin Point; and it is possible that a small vessel might find the same close under the extreme of the point, between which and the reefs there appears to be a clear but narrow passage.

CAPE AGULHAS, the southernmost point of the African continent, lies at the distance of about 84 miles, S.E. ½ S. (*E. by S. ¾ S.*), from the Cape Point of Good Hope. The land of Agulhas is even, having no high land within it for several miles in any direction, and it is always to be recollected, that the low land of the coast projects much farther to the South than any of the high land in the vicinity. The edge of the shore is uniformly rocky to a great distance, both eastward and westward of Cape Agulhas.†

Those from the eastward must take care, in the summer months, when the S.E. winds prevail, not to fall to leeward; for it will be very difficult to gain False Bay, if a ship first makes the Cape land when to the westward of it, during a strong S.E. wind. At times, ships from India, bound into Table Bay, have been obliged to bear away for St. Helena, in consequence of passing the Cape in the night, and being unable to beat against a strong easterly wind and leeward current.

Cape Agulhas is defined to be the rocky projection from the S.E. corner of the Agulhas Promontory, the centre of which promontory is about three-fourths of a mile westward of the projection, and about 200 yards more southerly, being the most southern part of Africa.

Description of the land.—The features of the land about Agulhas distinguish it from the neighbouring headlands. A ridge-shaped, undulating clump, rising from the flat ground, is separated into four ridge-shaped hills, by irregular ravines running nearly true East and West.

Viewed at a distance from seaward, easterly or westerly, the North and South elevations being seen nearly end on, resemble two oblong hummocks;

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* On August 30th, 1881, the SS. *Teuton* struck on a sunken rock, said to be 4 miles off the land, at Quoin Point; she backed off and foundered in 3½ hours, 227 lives being lost. She most probably struck on the rocks extending off Quoin Point.

† The Cape was named by its first discoverers, the Portuguese, *Cabo das Agulhas* (pronounced Agulias), which means *Needle's Cape;* and was so called from the compass having *no variation* here, on the first discovery of the Cape. Lagullas, Aguilhas, or Lagullus, are corruptions of the original name.

but the former, extending more easterly, appears the highest as seen from the eastward. Viewed at a distance from the southward, the South ridge masks the others, save at their East end. The highest part of the South ridge is 455 ft. above the level of the sea, and 1 mile from it. On the first undulation from the shore, which is about 55 ft. above the level of the sea, nearly true South of the highest point before mentioned, the lighthouse is built.

LIGHTHOUSE.—This is a fine building, consisting of a tower 100 ft. high, painted in red and white bands, and standing on an elevation of 55 ft. above the mean sea level; it bears N.W. by W. ½ W., 520 yards distant from the extreme point of Cape Agulhas. Lat. of the light, 34° 49′ 45·7″ S., long. 20° 0′ 40″ E., $1^h\ 20^m\ 2{\cdot}67^s$ East of Greenwich; 1° 31′ 55″, or $0^h\ 6^m\ 7{\cdot}67^s$ East of the Cape Observatory. The position may be considered to be an exact geographical point.

The light is a *fixed bright* light, at 128 ft. above the sea, and can be seen in any direction seaward between East and N.W. by W. from the tower, at the distance of 18 miles, from a deck 15 ft. high.

A great deal of discussion has been raised lately by the number of wrecks which have occurred on the rocks lying off Struys Point, for which locality this light is of very little use, being hidden by a bluff headland, lying 1 mile to the eastward of the lighthouse. This bluff is the proposed situation for the light at some future time, as it is undoubtedly in the wrong place at present.

The Coasts of the Cape Colony to the eastward are described in our DIRECTORY FOR THE INDIAN OCEAN, to which the reader is referred.

APPENDIX.

HYGIENIC RULES FOR THE PRESERVATION OF HEALTH IN WESTERN AFRICA AND OTHER TROPICAL CLIMATES.

By WILLIAM F. DANIELL, M.D., F.R.G.S., Staff-Surgeon.

(A large proportion of the coasts described in the preceding pages is comprised within the tropics, where climate has so marked an effect in subduing the health and energies of those natives of more temperate regions, who may be compelled to visit or reside there. These climatorial influences consequently greatly interfere with the development of commerce and the civilization of the natives of the countries which these coasts limit—regions unsurpassed in their fertility and productiveness. The African coasts contrast very unfavourably with those of Brasil in respect of their salubrity, owing to the influences of the prevailing easterly wind blowing over the continent, and thus bearing malaria and deleterious hygrometric changes in the first instance, and over the genial ocean in the second.

With these remarks we would direct special attention to the ensuing directions for the preservation of health in these regions. The well-known talents and skill of their author, who has favoured us with them, and whose works have been frequently quoted in the previous descriptions, will be an assurance of their efficiency and importance.—ED.)

The preservation of health, under ordinary circumstances, is a subject of serious consideration, but in unhealthy climates it becomes one of paramount importance. Diseases of tropical countries differ widely from those common to colder regions, and in general have a less fortunate issue. Engendered from a multiplicity of sources, they often assume an asthenic or typhoid form, run a sharp and rapid career, and, if unchecked, cease with a melancholy termination. In the alluvial and swampy districts of Western Africa, and even in the more elevated table lands, the maladies from which Europeans suffer are those generated by what has been termed *malaria*, and endemic or epidemic poison, resulting from a combination of various local and atmospheric influences. In many instances, when concentrated, they induce that morbid condition of the body which only ends with life; and as the diseases therefore, proceeding from these causes are not unfrequently developed in an aggravated form, and a low, insidious type, an active and energetic mode of treatment becomes immediately requisite. The climatorial agencies peculiar to the maritime countries of equinoctial Africa, have been considered to be more pernicious and unhealthy than those emanating from other portions of the same continent; their nature and predominant characteristics have not however been satisfactorily determined; they are nevertheless sufficiently deleterious to create an enormous sacrifice of human life, and, as experience demonstrates, demand a larger amount of skill and knowledge, to combat their depressing action on the frame, than similar agencies elsewhere within the tropics. The necessity for unacclimated persons adopting certain prophylactic measures, as might enable them to withstand the attacks of the local affections, and modify their severity, is too obviously enforced, to require comment. There can be little doubt that by an efficient and judicious code of sanitary regulations, a tolerable state of health may be maintained in several of these pestilential localities for a considerable period; but at the same time it must be distinctly understood, that though such regulations may prove unable to avert the accession of sickness, they will go far towards restricting its violence, and when the ordinary febrile and dysenteric diseases are somewhat divested of their more formidable symptoms, they will have lost much of that intractable character, so difficult of management, and consequently will be rendered more amenable to the remedial effects of medicine.

The seasons on the coast of Africa may be divided into two, viz., rainy and dry, the former of which is the most unhealthy for white residents and voyagers. The African climate derives its peculiar constitution from excessive atmospheric humidity, conjoined with an elevated temperature, and the constant exhalation of local miasms, more or less influenced in their noxious prevalence and origin by various electric laws, at present unknown and unappreciated. The following rules have chiefly guided the author, during a seventeen years' tour of service in most of the countries of Western Africa, and he has hitherto found them sufficiently effective to aid in the maintenance of good health, and the reduction probably of an otherwise heavy mortality.

1. The dress should be usually constituted of flannel, cotton, or such woollen fabrics as are best adapted for resisting the alternating vicissitudes of heat and cold. Flannel should be invariably worn next the skin, as during the rains it reduces the chilling influence of an active humidity, and in the dry and hot season absorbs the copious perspiration then exhaled, and by the moistened medium it affords, prevents direct evaporation from the cutaneous surface, a result always to be dreaded in tropical regions. In the cold and rainy season, shirts, trowsers, and in fact the entire dress, if composed of flannel, would be found to be the best means for resisting the injurious action of a humid atmosphere or heavy showers, and their concomitant sequelæ, rheumatism and fever. The head cannot be too carefully protected from a torrid sun, and thick felt caps, or straw hats well lined, will prove most serviceable. In their selection, those of a black colour should be avoided, as they absorb a greater degree of heat. The feet must also be kept well dried, and woollen socks are preferable to cotton, if they do not produce inconvenience.

2. As personal cleanliness is in every country essentially conducive to the preservation of health, it cannot but otherwise become in tropical climates one of the most important adjuncts to other measures deemed imperatively necessary. Ablutions of the body should at least occur daily, whenever the skin is not too much heated, and suitable opportunities offer. With reference to cold baths, some precautions are requisite, and as a general rule they ought never to be used by debilitated persons, convalescents, or others subject to special visceral diseases, or whenever the body is bathed in a profuse sweat from labour or exercise. If any chill or sensation of coldness is experienced after their employment, they must be abandoned, and tepid water substituted, which, to the unacclimated visitor and others, would on the whole be found far preferable. Alluvial and muddy water from creeks, rivers, lagoons, and the embouchures of streams, or in the immediate vicinity of the coast, should never be resorted to for abluent purposes, if a purer or better quality can be elsewhere obtained. Filtration would remove, to a certain extent, the impurities that abound in fresh water. The surface of the skin immediately after every bath, should be thoroughly dried by friction from a coarse towel, if no prickly heat or other cutaneous irritation exist. When, therefore, the body or clothes have been thoroughly wet and saturated, either from accidental circumstances, from immersions, or long continued exposure to heavy rains, the garments should be first removed without delay, and the skin be well rubbed with strong spirits (rum, Schiedam, or aquadente, would answer), until a sensation of warmth and dryness be induced. Dry clothes may then be assumed.

3. Undue exposure to the sun should be always avoided; and great care is equally necessary not to create excessive fatigue, if so exposed. The solar temperature attains

its maximum from 12^h to 5^h; all physical exertions or occupations should therefore be considerably restricted within these hours. Rest from all kinds of labour during mid-day will be attended by invigorating results. Business or pleasure avocations for any distance should be deferred until the cooler hours near sunrise or sunset. Whensoever imperative duties demand noonday visits from ship to shore, or from house to house, a cotton or silk umbrella must be employed to shield the head and eyes from the oppressive glare and heat that ordinarily prevails. From 5^h 30^m to 6^h a.m. are the hours best adapted for rising. Previous, however, to the commencement of the toils of the day, a cup of coffee, tea, or chocolate, should be swallowed, in conjunction with a small piece of bread or biscuit. The intervals least unfavourable for travelling, shooting, or scientific excursions, visits, or general recreations, are from 6^h to 9^h a.m., and from 4^h to 7^h p.m., the coolest portions of the day. The time for repose varies from 9^h to 11^h p.m., or according to the previous habits or inclinations of each individual. Moderate horse exercise is preferable to walking, whenever attainable. The propriety of issuing stringent regulations for the prohibition of all persons sleeping without proper shelter, and thereby being exposed to the heavy night dews, and cold baneful land winds, however pleasant and refreshing they may be, cannot be too forcibly inculcated; for the surface of the skin, relaxed by constant exudations of moisture, is in that languid condition which renders it more susceptible to the predisposing morbific influences, and dysenteries or febrile affections sooner or later inevitably follow. Reclining on the damp ground after protracted exercise, or sleeping in apartments on shore with open windows, permeated by irregular currents of air, either from inland or evening sea breezes, or in houses in close proximity to swampy localities or the banks of rivers, must, whenever practicable, be avoided. The more elevated the quarters are from the ground the greater will be the degree of salubrity, and the less danger will occur by prejudicial exhalations from decomposed vegetable matter, or other refuse of the soil.

4. The acclimatization of European constitutions to the exigencies and vicissitudes of a tropical clime, principally depends on a partial change or adaptation of diet. That the permanency of good health is directly influenced by a normal state of the digestive organs, there can be no question; and the golden rule must therefore be, to use that kind of food best calculated to afford due support to the body, without inducing subsequent exhaustion or debility, by impairing their functions or increasing their activity. The means hitherto discovered most efficient for the accomplishment of this object, have been derived from the experience of aboriginal authorities. The habits and customs of the native tribes will frequently be found, in these respects, a tolerably safe guide; proper allowance being made for the moral and physical distinctions of race, previous modes of living, &c. It must ever be borne in mind, that in hot countries comparatively less food is required than in cold ones; and that the stomach, after irregular intervals, loses much of its assimilative powers; and although no precise system of dietetics can be enunciated that would conclusively embrace the comprehensive details of this subject, yet an ordinary maxim may be thus elicited, viz., that edibles most nutritious and wholesome, the indigenous products of the place, ascertained to be commonly in vogue, and prepared by the simple processes of native cookery, should, more or less, enter into the composition of the chief daily meals, the number of which must be regulated in accordance with the necessities of climate and constitution. Animal substances should invariably be well cooked; boiled meat, in the form of soups and stews, is therefore preferable to the same when roasted. More of vegetable, and less of the animal constituents, should be the fundamental principle in the disposition of meals. In tropical Africa, rice, yams, sweet potatoes, kous-kous, cocos, and young cassada roots, constitute excellent substitutes for European vegetables. The oleaginous and other dishes of the natives, composed mostly of mutton, fowls, game, fresh and dried fish, with palm oil, ochros, peppers, yams, melochias, plantains, and other esculents, are very palatable and nourishing,

and appear well adapted for European use, if visitors cou
tolerate their somewhat nauseating aspect. Poultry is usual
and no better article of food could be purchased. Fish of va
and cured, with shrimps, crawfish, mangrove oysters, &c., car
in large quantities; when fresh, they are in general of goo
digestion. Oranges, pineapples, guavas, melons, limes, bana
soursops, custard apples, and other fruits, if immoderately
indigestion and diarrhœa, with other irritations of the bowel
to more serious disease. When desirable, a limited allowanc
in the morning, previous to breakfast. Punctuality in meals
of rest after each, ought, so far as is convenient, to be adopte
the digestive process.

The judicious use of wine and spirits may be advocated, si
mental to health, and their daily enjoyment often materially
viation of that climatic languor and debility, resulting from a
Good sherry, madeira, and bucellas may be administered wit
and others, and a few glasses at meal times is productive of
to the stomach. Port wine is commonly too much adultera
pounds, and other noxious ingredients, to be of benefit. W
may be drank in moderation, throughout the day, by those
use of ardent spirits, and will in some degree mitigate the co
Claret (Bordeaux wine) and water is also a pleasant and cool
inclined for weaker potations, and not predisposed to visceral
and other gastro-enteritic maladies. Abstinence from aqua
inferior rum and spirits cannot be too strictly enjoined, as th
digestive organs, but exert an injurious effect on the system
likewise be drank with some caution, as they tend to produc
habit of body, and ultimately dispose to apoplectic and co
sopp's or Bass's pale ale is, on the whole, more preferable to
the stronger ales, as they are manufactured of greater purity
and less subject to unwholesome adulteration. Occasionally
to exert a remarkably tonic influence on the worn out and
of the older colonists and traders. The moderate indulgenc
prejudicial to health; but great care is requisite that their g
habitual, so as to degenerate into excess, which is too frequ
dents in tropical countries.

5. Among the predisposing causes of sickness, one of th
dread and prostration of spirits that pervades almost every
first visit to this unhealthy coast. The unremitting fatality
with the depressing influences of climate, have certainly gai
globe an unenviable notoriety, which time can never dissi
the array of fearful drawbacks, individuals may reside in th
gions, unimpaired in health and constitution, for a considera
proper care and attention to hygienic considerations, by che
relative to future results, regularity and a tropical adaptati
nation to resist hypochondriacal forebodings, or despondent
propriate employment of time in judicious mental and physi
and by tranquillity of mind and an implicit reliance on the
of an all-wise Providence. By a conformity to these hin
Europeans live in some of the most sickly countries of We
of twenty and thirty years, and even upwards.

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